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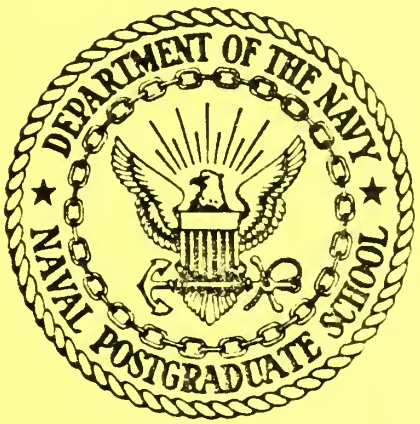

THE ESTABLISHMENT OF A NEW METHOD OF

ESTIMATING THE NUMBER OF ADVANCEMENTS

IN THE NAVY ENLISTED FORCE

by

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February 1978

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A model developed recently uses regression and analytic techniques to estimate the length of service (LOS) distribution of advancements in the Navy Enlisted Force by pay grade and rating. The distribution is a function of the total volume of advancees to a pay grade of the rating as well as the LOS distribution of the net inventory of the next lower pay grade of the same rating. The model previously tested for three ratings only is now extended to all ratings of the Navy Enlisted Force. The new procedure is then compared and found to

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ABSTRACT

A model developed recently uses regression and analytic techniques to estimate the length of service (LOS) distribution of advancements in the Navy Enlisted Force by pay grade and rating. The distribution is a function of the total volume of advancees to a pay grade of the rating as well as the LOS distribution of the net inventory of the next lower pay grade of the same rating. The model previously tested for three ratings only is now extended to all ratings of the Navy Enlisted Force. The new procedure is then compared and found to be superior to the currently used method of distributing advancees among LOS cells. This conclusion is based on the accuracy of the FY 1976 estimates.

FOREWORD

This research effort was initiated by the Naval Personnel Research and Development Center (NPRDC), San Diego, California and alternately sponsored by NPRDC and the Bureau of Naval Personnel (BUPERS), Washington, D.C. The author would like to express his appreciation for the valuable assistance provided by the staffs of Mr. Robert K. Lehto of BUPERS and Mr. Joe Silverman of NPRDC. Thanks are due to Mr. Robert Boller of NPRDC for his day-by-day assistance on the project.

I. INTRODUCTION

A. Background and Problem Statement

This is the third technical report on the problem of estimating the length of service (LOS) distribution of advancees in the Enlisted Navy. The research that was devoted to this topic was part of a series of research projects on personnel problems of the Enlisted Navy sponsored alternately by the Naval Personnel Research and Development Center (NPRDC) in San Diego and the Bureau of Naval Personnel (BUPERS) in Washington, D.C. during the fiscal years (FY) 1975-77.

The problem of estimating the LOS distribution of advancements, which is the subject of this report, originated in the notion that the shape of this distribution should be a highly sensitive function of the total "volume" of people to be advanced from one pay grade to the next. As was reported previously (Milch, 1976a and 1976b), the dependence of the LOS distribution of advancements on the total volume of advancees to a pay grade may be exhibited not from the data but through a model of the advancement system.

In fact, two models--a regression model (Milch, 1976a) and a simplified analytic model (Milch, 1976b)--were built. Both of these serve the purpose of estimating the LOS distribution of advancements as a function of the volume of advancements and the LOS distribution of the net inventory in the next lower pay grade. Net inventories are defined as inventories at the beginning of the fiscal year less losses plus nonrecruit gains to the Navy during the fiscal year. Net inventories in a pay grade serve as a resource population for advancees to the next higher pay grade.

The models developed in the reports by Milch, 1976a and 1976b were tested on three ratings (Operations Specialist, Radioman and Personnelman). They were also compared to the method of estimating the LOS distribution of advancements currently used by FAST, BUPERS' comprehensive computer model that

attempts to duplicate practically all personnel flows in the Navy Enlisted Force.

Based on these comparisons and on detailed discussions with the sponsors, it was decided to choose the analytic model (Milch, 1976b) for its conceptual and computational advantages and use it to estimate the LOS distribution of advancements of all ratings. Although based on the three ratings mentioned above the model's predictive qualities definitely surpassed those of FAST, it was considered necessary to compare the two estimating procedures for all ratings before the new method could be incorporated in FAST.

The present report summarizes some of the difficulties that were encountered when the new procedure was extended to all ratings and provides a rating-by-rating comparison with the current FAST estimating procedure. For a full understanding of the present report, it is necessary to have familiarity with the regression and analytic models both explained in Milch, 1976b.

II. DISCUSSION OF EXTENDING THE MODEL

A. Computational Problems of Extending the Model to All Ratings

In the previous report by Milch, 1976b the moments of the regression model were approximated by formulas that made their computation less cumbersome. From these formulas the parameters of the gamma distribution were estimated through the method of moments. Then the gamma distribution was used to provide an estimate of the LOS distribution of advancements to a pay grade of any given rating. This way the estimated distribution depended on only fifteen parameters. Although these fifteen parameters must originally be computed from the ninety-three regression coefficients of the regression model, this computation need be performed only once until new additional data becomes available. The fifteen parameters (for each pay grade of each rating) would then be stored in the computer.

From these parameters the model would then compute a new estimated LOS distribution of advancements for every new set of pay grade total (volume) of advancements and net inventory LOS distribution. When new data of net inventories and advancements become available the regression could be redone, a new set of fifteen parameters computed and stored in the computer. These could then be used for estimating the LOS distribution of advancements for the next fiscal year.

The extension of this procedure to all ratings presented some problems, mostly in cases where only a few years of data were available on which to perform the regression. The apparent statistical instability in the resulting regression coefficients caused the approximating formulas for the moments of the estimated LOS distribution of advancements to become highly inaccurate. This caused the formula for the sample variance to become negative in some cases which rendered the method of moments for estimating the gamma parameters infeasible.

In mathematical terms the problem is described as follows. The formulas approximating the first two moments of the regression model were given in Milch 1976b by

$$\hat{K}_1 \simeq 16 \frac{S_1(\alpha) + \hat{S}_1(\beta I) + S_1(\gamma)V}{S_o(\alpha) + \hat{S}_o(\beta I) + S_o(\gamma)V} \tag{1}$$

and

$$\hat{K}_2 \simeq 336 \frac{\hat{S}_2(\alpha) + \hat{S}_2(\beta I) + S_2(\gamma)V}{S_o(\alpha) + \hat{S}_o(\beta I) + S_o(\gamma)V} \tag{2}$$

where for $r = 0,1,2$

$$S_r(\alpha) = \frac{1}{n_r} \sum_{i=1}^{31} i^r \alpha_i \quad , \qquad n_r = \sum_{i=1}^{31} i^r$$

with $S_r(\beta I)$, $S_r(\gamma)$ defined analogously, and α_i, β_i, γ_i are the regression coefficients in the regression equations:

$$A_i = \alpha_i + \beta_i I_i + \gamma_i V \quad , \qquad i = 1,2, \ldots, 31 \quad .$$

Here A_i and I_i are the number of advancements to a pay grade and the net inventory in the next lower pay grade, respectively, both in LOS cell i. Finally, V is the total volume of advancements to the pay grade:

$$V = \sum_{i=1}^{31} A_i \quad .$$

Then the sample variance is computed from

$$\hat{K}_2' = \frac{V}{V-1} (\hat{K}_2 - \hat{K}_1^2) \quad . \tag{3}$$

In order to investigate under what circumstances $\hat{K}_2'$ may be negative formulas (1) and (2) are rewritten as

$$\hat{K}_1 \simeq 16 \frac{c + dV}{a + bV} \tag{4}$$

and

$$\hat{K}_2 \simeq 336 \frac{e + fV}{a + bV} \tag{5}$$

where

$$\begin{aligned} a &= S_o(\alpha) + \hat{S}_o(\beta I) \quad , \qquad b = S_o(\gamma) \\ c &= S_1(\alpha) + \hat{S}_1(\beta I) \quad , \qquad d = S_1(\gamma) \\ e &= S_2(\alpha) + \hat{S}_2(\beta I) \quad , \qquad f = S_2(\gamma) \ . \end{aligned} \tag{6}$$

Then $\hat{K}_2' < 0$ occurs iff

$$336(e + fV)(a + bV) - (16)^2 (c + dV)^2 < 0$$

that is iff

$$P(V) = AV^2 + BV + C < 0 \tag{7}$$

where

$$\begin{aligned} A &= 21bf = 16d^2 \\ B &= 21(af + be) - 32cd \\ C &= 21ae - 16c^2 \ . \end{aligned} \tag{8}$$

As is evident from (7) the problem becomes one of investigating the location of a parabola, $P(V) = 0$, with respect to the V-axis (see e.g. Thomas, 1962, pp. 465-473).

First, the coefficient A decides whether the parabola "opens" on the "top" or "bottom." Fortunately, A depends on the γ coefficients only and does not depend on the inventory distribution.

The case when $A \geq 0$ is the more favorable one because then--at least for

V large enough--$P(V) > 0$ and so $\hat{K}_2'$ is positive for large enough volume of advancements.

The case when $A < 0$ supplied some of the instances where the problem of a negative variance arose. Even when it did not for current volume of advancements, the potential was there that at some volume levels, reached in some future fiscal year, $P(V)$ and so $\hat{K}_2'$ also would turn negative. To forestall such eventuality a "correction" was made in the γ coefficients. Namely a new set of γ coefficients was defined as

$$\gamma_i' = [\gamma_i]^+ = \max(0, \gamma_i) \quad \text{for} \quad 1 \leq i \leq 31 \quad . \tag{9}$$

Then $\hat{K}_1$ and $\hat{K}_2$ were recomputed with γ_i' replacing every γ_i value, $1 \leq i \leq 31$. Then from (8) and (6)

$$A = 21\, S_o(\gamma')\, S_2(\gamma') - 16\, S_1^2(\gamma')$$

$$= \frac{1}{(31)^2}\ \frac{1}{16}\left\{ \sum_{i=1}^{31} \gamma_i' \sum_{i=1}^{31} i^2\, \gamma_i' - \left(\sum_{i=1}^{31} i\gamma_i' \right)^2 \right\} \geq 0 \tag{10}$$

using the Cauchy-Schwarz inequality (see e.g. Thomas, 1962, p. 152) with $a_i = \sqrt{\gamma_i'}$ and $b_i = i\sqrt{\gamma_i}$.

With the case $A < 0$ eliminated by design, the possibility of $A = 0$ still remained. From (10) it is evident that $A = 0$ could occur only when $\gamma_i' =$ same value for all $i = 1, \ldots, 31$. For all practical purposes this could occur only if all original $\gamma_i < 0$ thus making $\gamma_i' = 0$ for all $i = 1, \ldots, 31$.

Although this did not now occur in any of the pay grades of any of the ratings, its future possible occurrence is not ignored.

With $A \geq 0$ assured the remaining question is whether or not the parabola crosses the V-axis and if so whether on the positive or negative side. Since the parabola may be written as

$$A(V + \frac{B}{2A})^2 = P(V) - (C - \frac{B^2}{4A})$$

its vertex is at the coordinate point (h,k) where

$$h = -\frac{B}{2A} \quad \text{and} \quad k = -\frac{B^2 - 4AC}{4A}$$

and it crosses the V-axis at the points

$$V_1 = \frac{-B - \sqrt{B^2-4AC}}{2A}$$

and

$$V_2 = \frac{-B + \sqrt{B^2-4AC}}{2A} \tag{11}$$

provided $\Delta = B^2 - 4AC \geq 0$.

The case when $\Delta < 0$ causes no alarm, since then $P(V) > 0$ and so $\hat{K}_2' > 0$ for all values of V.

If $\Delta \geq 0$ and $V_2 \leq 0$ again problems cannot arise since $P(V) > 0$ and so $\hat{K}_2' > 0$ for all positive values of V.

If, however, $\Delta \geq 0$ and $V_2 > 0$ the problem of $\hat{K}_2' < 0$ will occur whenever the volume V happens to be lower than V_2. Indeed, the computations showed that after the "γ-correction" was made all problems arose in such cases. This problem was solved by the following procedure used whenever $\hat{K}_2' < 0$ occurred:

(i) Let $\hat{V}$ = smallest integer that is $\geq V_2$ (12)

(ii) Recompute $\hat{K}_1$, $\hat{K}_2$ and $\hat{K}_2'$ using formulas (1), (2) and (3) except that $\hat{V}$ replacing V.

Although this procedure is quite arbitrary, it does eliminate the problem of negative variance, it apparently is needed mostly in cases where the small amount of data available created a statistical instability and finally it

worked quite well in most instances. At any rate, it usually occurred when the volume was quite low and so the case was quite unimportant, yet a procedure was necessary to assure that the computer will not "hang up."

Note that the case when $A = 0$, i.e. the parabola becomes a straight line, is covered in the above case. Then

$$V_2 = \lim_{A \to 0} \frac{-B + \sqrt{B^2 - 4AC}}{2A} = -\frac{C}{B} \qquad (11'$$

and the rest follows as before.

The estimation procedure may be summarized in the following points:

(i) Perform regression analysis as described in Milch 1976b to obtain regression coefficients α_1, β_1, γ_1 for $i = 1,2, \ldots, 31$.

(ii) Compute the fifteen parameters $S_r(\alpha)$, $S_r(\beta)$, $S_r(\beta^2)$, $S_r(\gamma)$ and ρ_r $r = 0,1,2$; then compute $\hat{S}_r(\beta I)$ for $r = 0,1,2$ as described in Milch, 19

(iii) Compute A from formulas (8) and (6). If $A < 0$ redefine γ_i, $1 \leq i \leq 31$, according to formula (9).

(iv) Compute $\hat{K}_1$, $\hat{K}_2$ and $\hat{K}_2'$ from formulas (1), (2) and (3). If $\hat{K}_2' \leq 0$ compute A, B, C from formulas (8) and define $\hat{V}$ from formulas (12) and (11) when $A > 0$ or formulas (12) and (11') when $A = 0$. Then recompute $\hat{K}_1$, $\hat{K}_2$ and $\hat{K}_2'$ using $\hat{V}$ in place V in formulas (1), (2) and (3).

(v) Estimate the gamma parameters via the method of moments, i.e.

$$\hat{g} = \frac{\hat{K}_1^2}{\hat{K}_2'} \quad \text{and} \quad \hat{\lambda} = \frac{\hat{K}_1}{\hat{K}_2'} .$$

(vi) Compute the discretized gamma distribution:

$$\hat{f}(i; \hat{g}, \hat{\lambda}) = \frac{i^{\hat{g}-1} e^{-\hat{\lambda} i}}{\sum_{j=1}^{31} j^{\hat{g}-1} e^{-\hat{\lambda} j}} \quad \text{for} \quad 1 \leq i \leq 31 .$$

(vii) If $\hat{g} > 50$ use the discretized normal distribution instead of the above:

$$\hat{f}(i;\ \hat{g},\ \hat{\lambda}) = \frac{e^{-\frac{1}{2}\left(\frac{i-\mu}{\hat{\sigma}}\right)^2}}{\sum_{j=1}^{31} e^{-\frac{1}{2}\left(\frac{j-\hat{\mu}}{\hat{\sigma}}\right)^2}} \quad \text{for} \quad 1 \leq i \leq 31$$

where $\hat{\mu} = \hat{K}_1$ and $\hat{\sigma} = \sqrt{K_2'}$

The last step was used to avoid some computational difficulties with the gamma distribution when $g > 50$.

B. Some Data Problems

Some difficulties with the data was described previously in reports Milch, 1976a and 1976b. All data used here were supplied by NPRDC. The regression analysis was performed with the data for the 1966-76 period or whatever portion of it was available for a specific pay grade and rating.

The net inventory data was computed by NPRDC from beginning inventory and non-recruit gains and losses. This data bears the label of matrix ID997. Advancement data was available both "into" a pay grade and "out of" a pay grade. Generally advancements "into" a pay grade were used here. This data bears the label of matrix ID800.

There were some exceptions to this in cases where so-called general ratings and service ratings interrelate at a certain pay grade level.

In Appendix A a list of all ratings and their codes is given. The list also indicates the range of pay grades (PG) for each rating. A distinction between general (GEN) and service (SER) ratings is also shown in the list.

This is essential because of the way service ratings are related to certain general ratings. Basically two types of relationships exist:

(i) "branching off" relationship where a service rating branches off from a general rating at some pay grade, e.g. the rating Legalman (LN, rate code 1750) branches off the rating Yeoman (YN, rate code 1700) at pay grade E5;

(ii) "merging" relationship where two or three service ratings merge into a general rating at some pay grade, e.g. ratings Missiles Gunners Mate (GMM, rate code 0601) and Guns Gunners Mate (GMG, rate code 0604) merge into rating Gunners Mate (GM, rate code 0600) at pay grade E8.

These service ratings and their relationships to their general rating are shown graphically in Appendix B.

For both types of service ratings some explanation is necessary regarding the use of the data and the estimation procedure. In the case of a service rating "branching off" at a certain pay grade, e.g. rating 1750 branching off rating 1700 at pay grade E5, the regression analysis for the service rating in pay grade E5 used the net inventory of pay grade E4 of the general rating. Similarly when estimating advancements to pay grade E5 of rating 1750 (service rating) via the estimation procedure described in Section A the appropriate inventories are those in pay grade E4 of rating 1700 (general rating).

Another exception arises when estimating advancements from the highest existing pay grade of services ratings that merge into a general rating. Here the advancement data used in the regression analysis was advancements "out of" a pay grade. This data is labeled as matrix ID810. In these cases there were two or three sets of estimated advancements to the lowest existing pay grade of the general rating, namely one from the highest existing pay grade of each of the relevant services ratings. To distinguish among these sets of estimated advancements, they are listed among the service ratings even though they are

advancements to a pay grade that exists for the corresponding general rating only. To draw attention to this fact the rate codes bear a negative sign in front of the code number. Thus advancements from pay grade E7 of service ratings 0601 and 0604 to pay grade E8 of general rating 0600 are shown as advancements to pay grade E8 of ratings "-0601" and "-0604." This is evident in Appendix C where the errors defined in the next section are shown for all pay grades of all ratings.

III. COMPARISON OF THE MODEL TO THE CURRENTLY USED FAST METHOD

FAST, the computer model used by BUPERS to make personnel predictions for the Navy Enlisted Force (see Boller, 1974 and Silverman, 1977) has incorporated in it a procedure to predict advancements by LOS. The procedure first computes historical rates of advancements details of which are described in a working paper by Leland (1976) of the Naval Personnel Research and Development Center. If these rates are denoted by H_i, $1 \leq i \leq 31$, the advancement LOS distribution used by FAST is given by

$$F_i' = \frac{0.9H_i + 0.1I_i}{\sum_{j=1}^{31} (0.9H_j + 0.1I_j)} \quad \text{for} \quad i = 1, \ldots, 31$$

i.e. advancements are estimated as a mixture of the historical rates of advancements and the current resource population (net inventories).

To compare the FAST estimation with the estimates produced by this study, three measures of error were devised. These errors were defined in Milch 1976b and are reproduced here for ease of reference.

(i) The difference between the actual and the estimated mean LOS of advancements:

$$\Delta_1 = K_1 - \tilde{K}_1 \quad .$$

(ii) The difference between the standard errors of the actual and the estimated LOS distributions of advancements:

$$\Delta_2 = \sqrt{K_2'} - \sqrt{\tilde{K}_2'}$$

Here K_2' is the sample variance of the actual LOS distribution of advancements and $\tilde{K}_2'$ is the sum of squares of the difference between

the estimated number of advancements and the actual mean LOS of advancements. For example, for the estimated LOS distribution of advancements provided by the model in the previous section

$$\tilde{K}_2' = \frac{V}{V-1} \sum_{i=1}^{V} (i-K_1)^2 \hat{f}_i = \frac{V}{V-1} (\hat{K}_2 - 2K_1\hat{K}_1 + K_1^2) \quad .$$

Note that this quantity differs from $\hat{K}_2'$ as defined by Formula (3). For the FAST model $\tilde{K}_2'$ is computed analogously.

(iii) The Kolmogorov-Smirnov (K-S) Statistic: The largest absolute difference between the actual and estimated cumulative sample distribution functions:

$$\Delta_3 = \max_{1 \leq i \leq 31} \left| \sum_{j=1}^{i} F_j - \sum_{j=1}^{i} \tilde{F}_j \right|$$

where F_j is the actual relative frequency of advancees in LOS cell j and $\tilde{F}_j$ is its estimate. In particular,

$$\tilde{F}_j = \begin{cases} \hat{f}(j; \hat{g}, \hat{\lambda}) & \text{for the advancement model} \\ F_j' & \text{for the FAST methodology} \quad . \end{cases}$$

The meaning of error Δ_1 is quite clear and an accurate estimation procedure should have a Δ_1 close to zero. As a rule of thumb, a mean LOS which is off by no more than half a year, i.e. $|\Delta_1| \leq .5$, may be considered a quite accurate estimate of the actual mean LOS of advancements. Perhaps for the upper pay grades E7, E8 and E9 a somewhat bigger Δ_1 error is also acceptable.

The meaning of error Δ_2 is less obvious. The original thought behind it was to introduce an error that would compare the estimated and actual standard deviations of the LOS distribution of advancements. The actual standard deviation, of course, is a measure of the dispersion, about the actual mean LOS,

of the actual LOS distribution of advancements. The estimated standard deviatio measures the analogous quantity for the estimated LOS distribution of advancements. It seems more appropriate, however, to compare the actual dispersion (i.e. standard deviation) to the estimated dispersion, about the actual mean LOS, of the estimated LOS distribution of advancements. This is precisely what the error Δ_2 accomplishes.

Finally, to create a gauge that measures the accuracy of the entire distribution itself, the error Δ_3 was devised. As is clear from its definition Δ_3 compares the actual and estimated cumulative distribution functions and is determined by their greatest absolute difference. Contrary to Δ_1 and Δ_2, the error Δ_3 is always nonnegative.

Of these three errors Δ_1 and Δ_3 seemed to be the most useful. Error Δ_2 is somewhat difficult to interpret and sometimes took on values that contradicted both Δ_1 and Δ_3. Indeed, it seems that a method of estimation that is accurate in terms of its mean (Δ_1 error) and in terms of the overall distribution (Δ_3 error) may be judged to be a satisfactory estimation procedure.

The procedure used here to compare the two estimation methods was to estimate the FY 1976 advancements for each pay grade of each rating using both the FAST and the advancement model. Since actual FY 1976 advancement data was available the errors Δ_1, Δ_2, and Δ_3 could be computed and compared for the two models.

In Appendix C the errors Δ_1, Δ_2, and Δ_3 are listed for every pay grade of every rating for both the FAST and the advancement models. These lists provide a rating by rating comparison, for each pay grade, of the two estimation procedures. One may compare them, for example, in terms of rating 000 which is the code for ALLNAVY, i.e. advancements in the entire Enlisted Force. The list of errors are shown in Table 1 for easy comparison.

ALLNAVY Errors

PG	Model	Error Δ_1	Error Δ_2	Error Δ_3
E4	FAST	0.737	0.103	0.295
	ADV.	0.349	0.232	0.143
E5	FAST	0.719	0.009	0.180
	ADV.	0.758	0.177	0.260
E6	FAST	1.317	-0.123	0.189
	ADV.	-0.032	-0.134	0.050
E7	FAST	1.319	-0.911	0.151
	ADV.	0.290	-0.217	-.075
E8	FAST	-0.249	-0.691	0.057
	ADV.	0.557	0.512	0.116
E9	FAST	-0.538	-0.924	0.089
	ADV.	0.437	-0.261	0.110

TABLE 1

From Table 1 the advancement model is seen to be superior, although not uniformly so. In terms of error Δ_1 the advancement model is occasionally, as in case of E6 and E7, vastly superior to FAST. When FAST is better than the advancement model, as in case of E5 in terms of all three measures, the difference is not very significant.

Since a rating-by-rating comparison from Appendix C is awkward between the two estimation procedures, histograms were prepared for each pay grade that show the relative frequencies of errors of each type among all the ratings. These histograms are displayed side by side for the two estimation procedures in Appendices D, E, and F for errors Δ_1, Δ_2, and Δ_3, respectively. The horizontal scales were fixed for each pay grade to be the same for the FAST and the advancement models to facilitate the comparison. Each histogram carries under it a wealth of statistical information related to it. Among all these statistical measures appears the median which in this case is a value such that exactly half the ratings have errors exceeding it. These medians were selected as the best <u>single</u> statistical measure by which to compare the two methods. Table 2 provides a summary of these median errors for both methods for each pay grade E4 through E9. In addition to these six pay grades, the table includes the median errors of all pay grades which were taken from histograms also included in Appendices D, E, and F.

Both the histograms themselves and their brief summary in Table 2 reveal that the advancement model does almost uniformly better than the FAST model. Notable exception is pay grade E5 where FAST has somewhat smaller Δ_1 and Δ_3 errors. It is quite conspicuous from Table 2, however, that in pay grades E6, E7, and E9 FAST grossly underestimates the mean LOS whereas the advancement model makes only small errors overestimating the mean.

A disadvantage in comparing the two methods by the histograms in Appendices

Median Errors Among All Ratings

PG	Model	Error Δ_1	Error Δ_2	Error Δ_3
E4	FAST	0.6139	-0.1074	.3477
	ADV.	0.3117	0.0671	.1885
E5	FAST	0.4017	-0.3472	.1595
	ADV.	0.4416	-0.0838	.2458
E6	FAST	1.0747	-0.5788	.2549
	ADV.	-0.1318	-0.2534	.1614
E7	FAST	1.0838	-1.0086	.2138
	ADV.	0.1722	-0.524	.1467
E8	FAST	-0.3887	-1.3209	.2528
	ADV.	0.0136	-0.9930	.2824
E9	FAST	1.2677	-5.4752	.3473
	ADV.	-0.0516	-2.0066	.3709
ALL	FAST	0.6147	-0.6714	.2510
	ADV.	0.2384	-0.1969	.2100

TABLE 2

D, E, and F is that all ratings, small or large, are treated equally. In actuality accurate predictions in ratings with only few advancees matter little in comparison to ratings where several hundred (or thousand) advancements are made each year. For that reason, pay grades with low volume were first eliminated and then new histograms produced of the remaining errors. What constitutes "low volume" was arbitrarily decided for each pay grade separately. Thus for pay grades E4 through E9 the ratings for which the total number (volume) of advancements made in FY 1976 were below the numbers 3, 10, 20, 32, 40, and 50, respectively, were omitted from the next set of histograms shown in Appendices G, H, and I. A summary of the median errors among these "high volume" ratings is provided in Table 3.

The results in these histograms and in Table 3 are not significantly different from those presented above for all ratings. FAST shows some improvement, especially in pay grade E9 where ratings of only one or two advancees have been eliminated. The advancement model stays at the same level of accuracy or improves somewhat.

Finally, it may be pointed out that there are some cases where both FAST and the advancement model produce extremely poor estimates. Most of these cases occur in pay grades with very low volume where the data lacks statistical stability. Because of the low volume these cases are considered unimportant. There are some few instances, however, where the estimates perform poorly even though there is sufficient data to have established statistical stability. The most notable example is pay grade E4 of rating Mess Management Specialist (MS, rate code 2200). Although the volume of advancements was almost 3000 in FY 1976, FAST and the new model both underestimated the mean LOS of advancements by unacceptable amounts (2.5 and 1.6 years, respectively). The only possible explanation for this is that BUPERS made radical changes in its advancemen policy for this rating in FY 1976 which rendered the statistical data of the past ten years meaningless.

Median Errors

Among High Volume Ratings Only

PG	Model	Error Δ_1	Error Δ_2	Error Δ_3
E4	FAST	0.6201	-0.0885	.3486
	ADV.	0.3121	0.0747	.1854
E5	FAST	0.4084	-0.3331	.1625
	ADV.	0.4416	-0.0838	.2452
E6	FAST	1.1032	-0.5219	.2396
	ADV.	-0.1318	-0.2176	.1427
E7	FAST	1.0664	-0.9393	.2086
	ADV.	0.1546	-0.0644	.1298
E8	FAST	-0.2780	-0.9537	.1632
	ADV.	0.0691	-0.3710	.1979
E9	FAST	0.3253	-3.4883	.2218
	ADV.	-0.2604	-1.4960	.2712
ALL	FAST	0.6139	-0.4915	.2329
	ADV.	-0.2604	-0.1156	.1889

TABLE 3

IV. CONCLUSIONS AND RECOMMENDATIONS

A rating-by-rating comparison of the estimation method of FAST, currently used by BUPERS, and the newly constructed method of estimating advancements described previously (Milch, 1976b) clearly shows the overall superiority of the latter. Exceptions to this rule do exist, depending also on which measure of comparison is used, most notably in pay grade E5. However, FAST practically nowhere appears to be overwhelmingly superior to the advancement model. The opposite of this occurs in many cases; namely, in pay grades E6, E7, and E9 the advancement model outperforms FAST by a huge degree when measured by the accuracy of the mean LOS estimate.

It is recommended therefore that BUPERS modify the FAST model by incorporating in it the newly constructed method of estimating advancements. Efforts are currently under way to produce programs that will facilitate such a conversion of FAST.

This recommendation is made in full recognition of the fact that the accuracy may deteriorate in future years. As indicated in Section III, in some ratings the estimates proved to be highly inaccurate probably due to abrupt changes in advancement policies. Obviously such changes may occur in the future again. Although in such cases the recommended estimation procedure may break down there is no reason to think that it would do so more often or to a larger extent than the currently used FAST method.

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APPENDIX A

LIST OF RATINGS

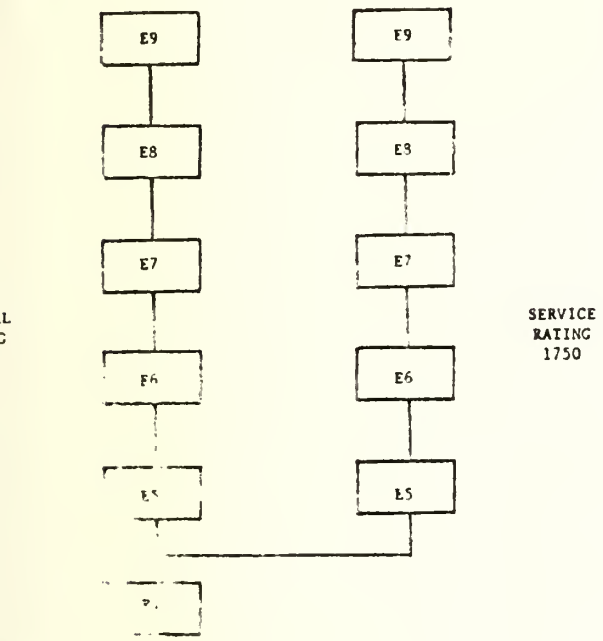
	RATING TITLE	RATE CODE	LOW PG	HIGH PG	RATING TYPE	NO. SER. RATINGS
	ALL NAVY	0000	3	9	ALL	0
BM	BOATSWAINS MATE	0100	4	9	GEN	0
MA	MASTER AT ARMS	0150	6	9	SER	0
QM	QUARTERMASTER	0200	4	9	GEN	0
SM	SIGNALMAN	0250	4	9	GEN	0
OS	OPERATIONS SPECIALIST	0300	4	9	GEN	0
EW	ELECTRONICS WARFARE TECHNICIAN	0350	4	9	GEN	0
STG	SONAR TECHNICIAN (SURFACE)	0401	4	9	GEN	0
STS	SONAR TECHNICIAN (SUBMARINE)	0404	4	9	GEN	0
OT	OCEAN SYSTEMS TECHNICIAN	0450	4	9	GEN	0
TM	TORPEDOMANS MATE	0500	4	9	GEN	0
GM	GUNNERS MATE	0600	3	9	GEN	2
GMM	GUNNERS MATE (MISSILES)	0601	4	7	SER	0
GMT	GUNNERS MATE (TECHNICIAN)	0602	4	9	GEN	0
GMG	GUNNERS MATE (GUNS)	0604	4	7	SER	0
FT	FIRE CONTROL TECHNICIAN	0800	3	9	GEN	3
FTG	FIRE CONTROL TECH. (GUN)	0801	4	7	SER	0
FTM	FIRE CONTROL TECH. (SURFACE)	0802	4	7	SER	0
FTB	FIRE CONTROL TECH. (BALLISTIC)	0803	4	7	SER	0
MT	MISSILE TECHNICIAN	0810	4	9	GEN	0
MN	MINEMAN	0900	4	9	GEN	0
ET	ELECTRONICS TECHNICIAN	1000	6	9	GEN	2
ETN	ELECTRONICS TECHNICIAN (COMM.)	1001	4	5	SER	0
ETR	ELECTRONICS TECHNICIAN (RADAR)	1002	4	5	SER	0
DS	DATA SYSTEMS TECHNICIAN	1010	4	9	GEN	0
IM	INSTRUMENTMAN	1100	4	9	GEN	0
	ALL NAVY - USN	1111	3	9	ALL	0
OM	OPTICALMAN	1200	4	9	GEN	0
NC	NAVY COUNSELLOR	1400	6	9	SER	0
RM	RADIOMAN	1500	4	9	GEN	0
CTT	COMMUNICATIONS TECH. (TECHNICAL)	1611	4	9	GEN	0
CTA	COMMUNICATIONS TECH. (ADMIN.)	1622	4	9	GEN	0
CTM	COMMUNICATIONS TECH. (MAINT.)	1633	4	9	GEN	0
CTO	COMMUNICATIONS TECH. (COMM.)	1644	4	9	GEN	0
CTR	COMMUNICATIONS TECH. (COLLECT.)	1655	4	9	GEN	0
CTI	COMMUNICATIONS TECH. (INTERP.)	1666	4	9	GEN	0
YN	YEOMAN	1700	4	9	GEN	1
LN	LEGALMAN	1750	5	9	SER	0
PN	PERSONNELMAN	1800	4	9	GEN	1
DP	DATA PROCESSING TECHNICIAN	1900	4	9	GEN	0
SK	STOREKEEPER	2000	4	9	GEN	1
DK	DISBURSING CLERK	2100	4	9	GEN	0
MS	MESS MANAGEMENT SPECIALIST	2200	4	9	GEN	0
IS	INTELLIGENCE SPECIALIST	2300	4	9	GEN	0
SH	SHIPS SERVICEMAN	2490	4	9	GEN	0
JO	JOURNALIST	2600	4	9	GEN	0
PC	POSTAL CLERK	2700	4	9	GEN	0
LI	LITHOGRAPHER	3100	4	9	GEN	0
DM	ILLUSTRATOR DRAFTSMAN	3200	4	9	GEN	0
MU	MUSICIAN	3300	4	9	GEN	0
	ALL NAVY - USNR	3333	3	9	ALL	0
MM	MACHINISTS MATE	3700	4	9	GEN	0
EN	ENGINEMAN	3800	4	9	GEN	0

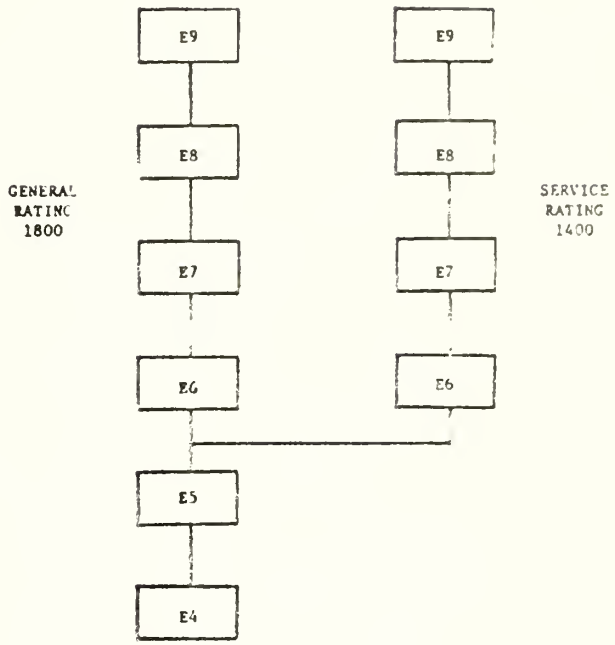
	RATING TITLE	RATE CODE	LOW PG	HIGH PG	RATING TYPE	NO. SE RATING
MR	MACHINERY REPAIRMAN	3900	4	9	GEN	0
BT	BOILERMAN	4000	4	9	GEN	0
EM	ELECTRICIANS MATE	4100	4	9	GEN	0
IC	INTERIOR COMMUNICATION ELEC.	4200	4	9	GEN	0
HT	HULL TECHNICIAN	4300	4	9	GEN	0
PM	PATTERNMAKER	4600	4	9	GEN	0
ML	MOULDER	4700	4	9	GEN	0
EA	ENGINEERING AID	5100	4	9	GEN	0
CE	CONSTRUCTION ELECTRICIAN	5300	4	9	GEN	0
EO	EQUIPMENT OPERATOR	5410	4	9	GEN	0
CM	CONSTRUCTION MECHANIC	5500	4	9	GEN	0
BU	BUILDER	5600	4	9	GEN	0
SW	STEEL WORKER	5700	4	9	GEN	0
UT	UTILITIESMAN	5800	4	9	GEN	0
AD	AVIATION MACHINISTS MATE	6200	4	9	GEN	0
AT	AVIATION ELECTRONICS TECH.	6300	4	9	GEN	0
AX	AV. ANTISUB. WARFARE TECH.	6310	4	9	GEN	0
AW	AV. ANTISUB. WARFARE OPERATOR	6400	4	9	GEN	0
AO	AVIATION ORDANCEMAN	6500	4	9	GEN	0
AQ	AV. FIRE CONTROL TECHNICIAN	6520	4	9	GEN	0
AC	AIR CONTROLMAN	6600	4	9	GEN	0
AB	AVIATION BOATSWAINS MATE	6700	8	9	GEN	3
ABE	AV. BOATS MATE (LAUNCH/RECOVER)	6704	4	7	SER	0
ABF	AV. BOATS MATE (FUELS)	6705	4	7	SER	0
ABH	AV. BOATS MATE (HANDLING)	6706	4	7	SER	0
AE	AVIATION ELECTRICIANS MATE	6800	4	9	GEN	0
AM	AVIATION STRUCTURAL MECHANIC	6900	8	9	GEN	3
AMS	AV. STRUCT. MECH. (STRUCTURES)	6901	4	7	SER	0
AMH	AV. STRUCT. MECH. (HYDRAULICS)	6902	4	7	SER	0
AME	AV. STRUCT. MECH. (SAFTEY EQP.)	6903	4	7	SER	0
PR	AIRCREW SURVIVAL EQUIPMENTMAN	7000	4	9	GEN	0
AG	AEROGRAPHERS MATE	7100	4	9	GEN	0
TD	TRADEVMAN	7200	4	9	GEN	0
AK	AVIATION STOREKEEPER	7300	4	9	GEN	0
AZ	AV. MAINT. ADMINISTRATIONMAN	7400	4	9	GEN	0
AS	AV. SUPPORT EQUIP. TECHNICIAN	7500	6	9	GEN	3
ASE	AV. SUP. EQ. TECH. (ELECTRICAL)	7501	4	5	SER	0
ASH	AV. SUP. EQ. TECH. (HYD/STRUCT)	7502	4	5	SER	0
ASM	AV. SUP. EQ. TECH. (MECHANICAL)	7503	4	5	SER	0
PH	PHOTOGRAPHERS MATE	7600	4	9	GEN	0
HM	HOSPITAL CORPSMAN	8000	4	9	GEN	0
DT	DENTAL TECHNICIAN	8300	4	9	GEN	0

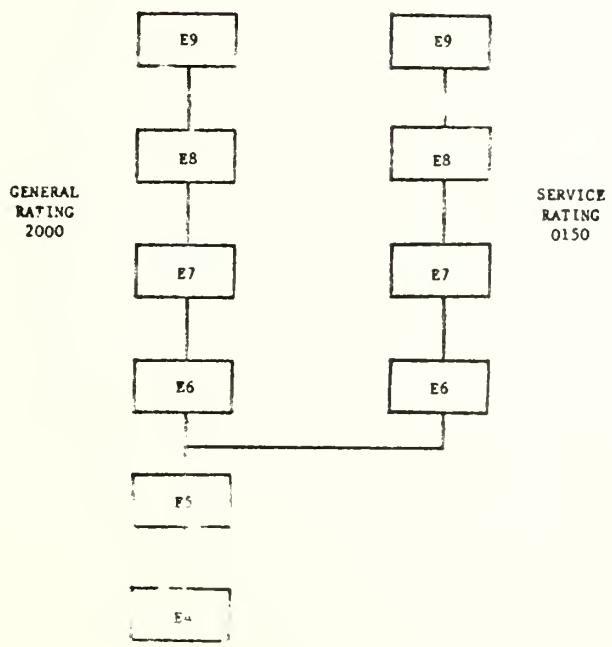
APPENDIX B

RELATIONSHIPS OF GENERAL RATINGS TO THEIR SERVICE RATINGS

(i) "Branching Off" Type







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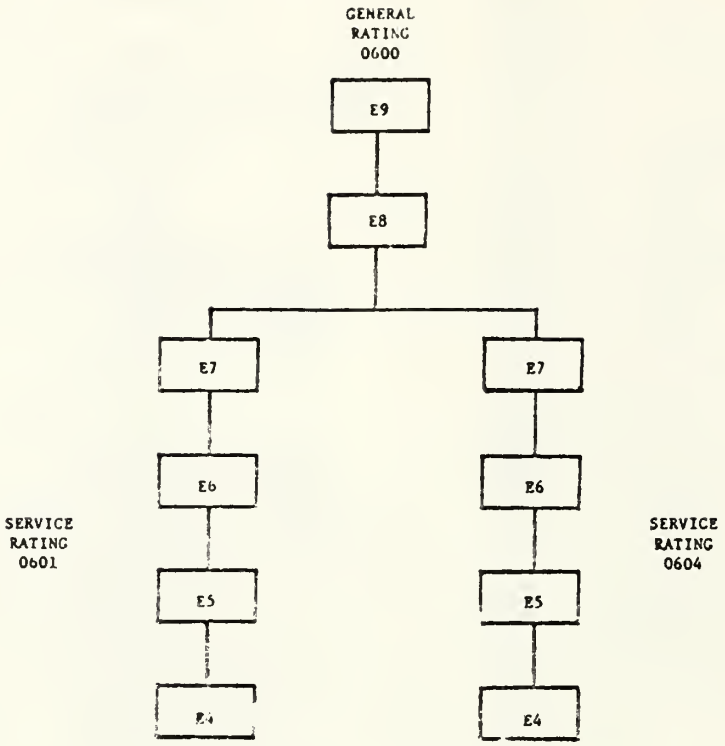

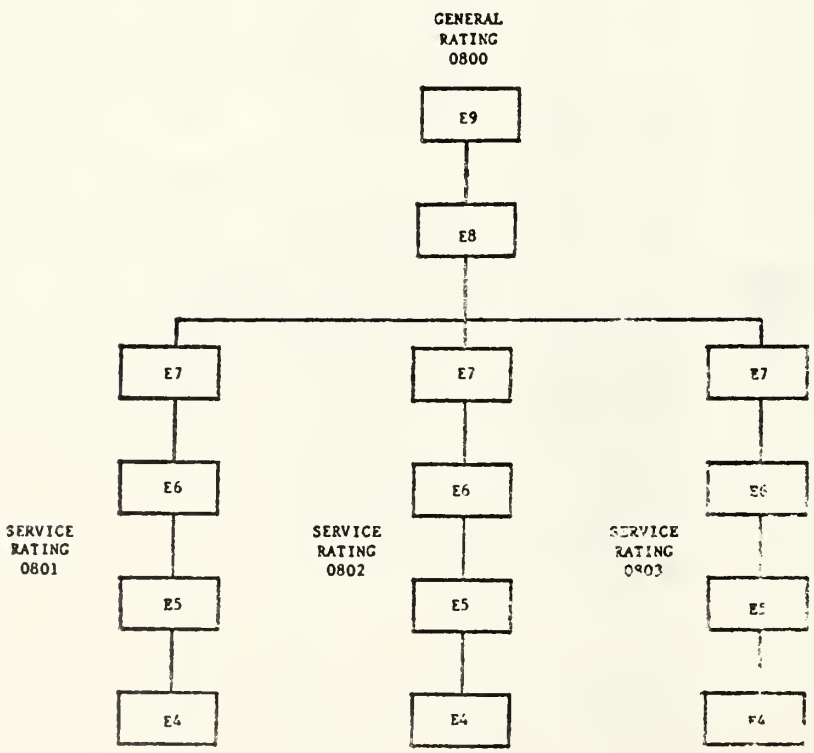

APPENDIX B (Continued)

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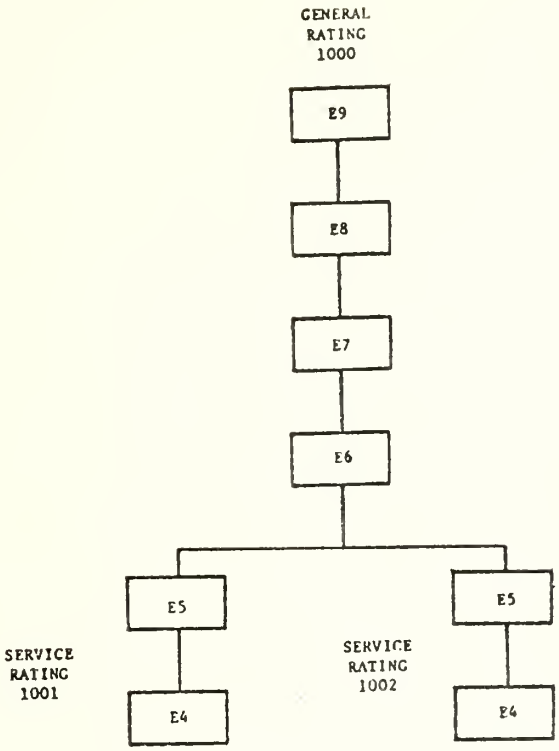

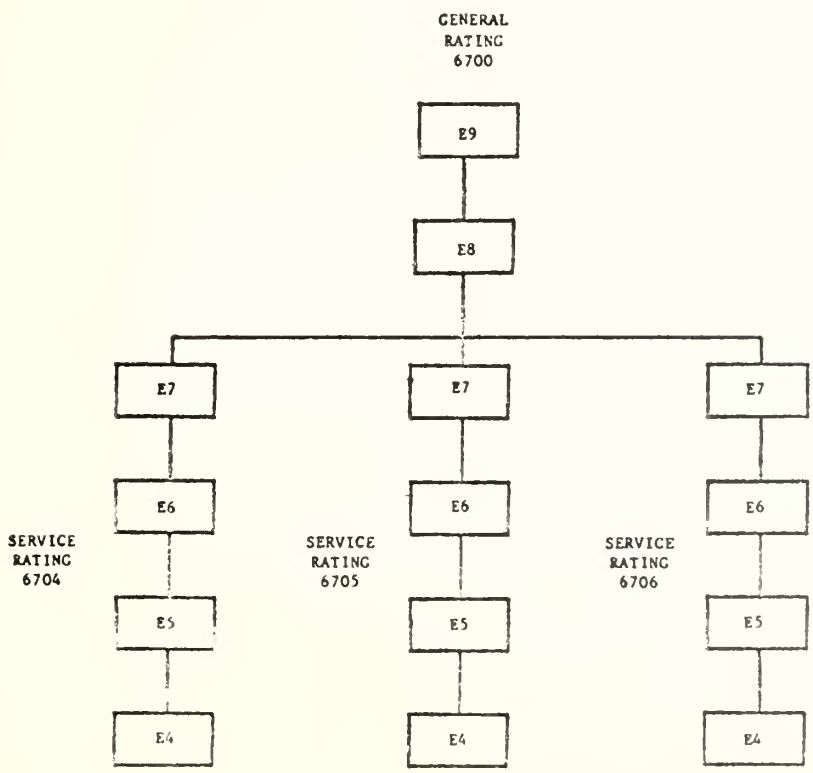

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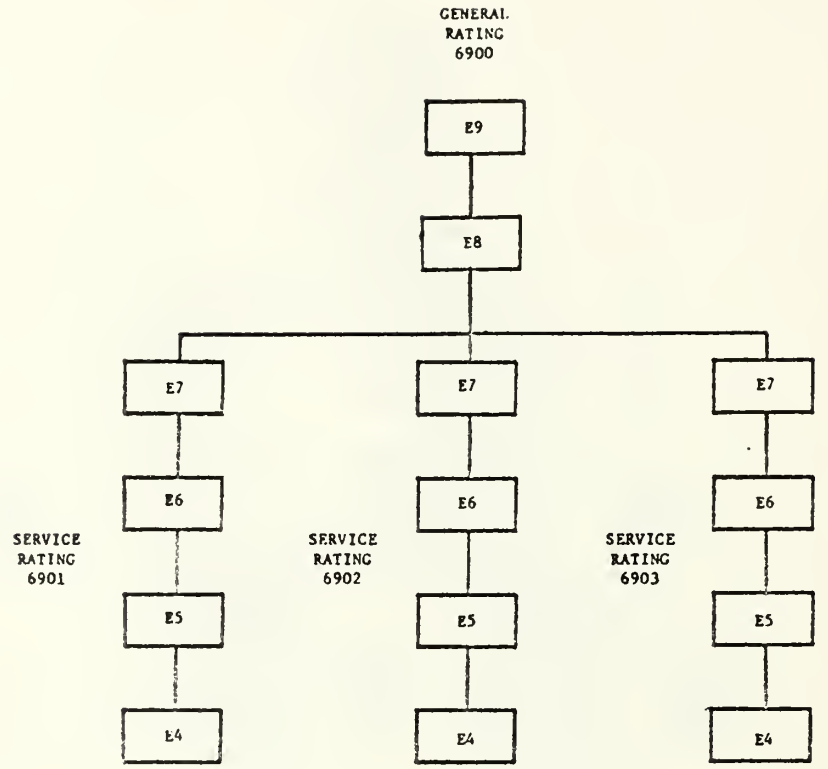
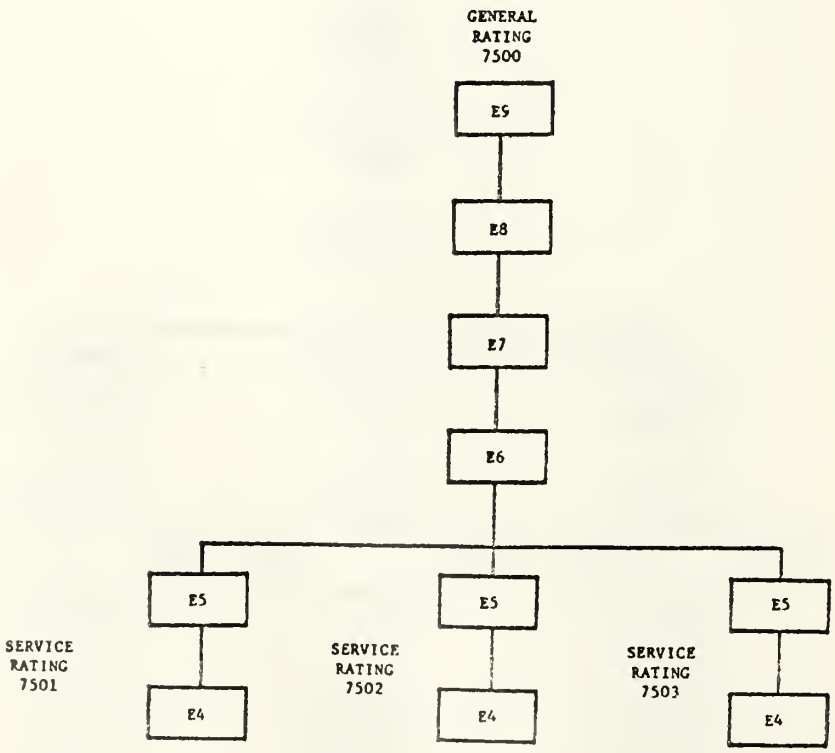




APPENDIX C

LIST OF ERRORS OF ALL RATINGS

1. FAST Model Errors

PAYGRADE E4

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	5345.0	0.737	0.103	0.295
-100	2060.0	-0.054	-0.358	0.028
150	0.0	999.000*	999.000	999.000
200	707.0	0.057	-0.199	0.348
250	386.0	0.048	-0.270	0.432
300	1294.0	-0.720	-0.017	0.397
350	340.0	-0.733	-0.287	0.462
401	450.0	-0.172	-0.125	0.091
404	353.0	-0.463	0.051	0.340
-450	237.0	-0.614	-0.089	0.349
500	419.0	0.725	0.037	0.386
600	0.0	999.000	999.000	999.000
601	105.0	0.754	-0.057	0.395
-601	0.0	999.000	999.000	999.000
602	179.0	0.671	-0.107	0.403
604	671.0	1.115	0.203	0.443
-604	0.0	999.000	999.000	999.000
650	0.0	999.000	999.000	999.000
801	824.0	0.391	0.231	0.127
-801	0.0	999.000	999.000	999.000
802	450.0	0.015	0.155	0.052
-802	0.0	999.000	999.000	999.000
803	200.0	-3.022	-2.946	0.815
-803	0.0	999.000	999.000	999.000
810	450.0	-1.696	-1.743	0.760
900	71.0	0.620	-0.335	0.375
1000	0.0	999.000	999.000	999.000
1001	953.0	-0.634	-0.672	0.273
-1001	0.0	999.000	999.000	999.000
1002	509.0	-0.324	-0.169	0.183
-1002	0.0	999.000	999.000	999.000
1010	344.0	-0.777	-0.825	0.460
1100	58.0	0.717	-0.373	0.383
1200	42.0	0.531	-0.314	0.401
1900	0.0	999.000	999.000	999.000
1500	2522.0	0.612	0.054	0.305
1511	109.0	0.723	0.173	0.381
1622	145.0	0.555	-0.342	0.441
1635	151.0	-2.220	-2.445	0.684

1644	504.0	0.661	-0.042	0.419
1655	173.0	0.366	0.011	0.501
1666	124.0	0.416	-0.035	0.230
1700	1341.0	0.805	-0.224	0.382
1750	0.0	999.000	999.000	999.000
1800	1025.0	0.721	-0.200	0.423
1900	420.0	0.581	-0.334	0.415
2000	1548.0	0.726	-0.123	0.331
2100	329.0	0.679	-0.011	0.376
2200	2911.0	2.479	-0.814	0.469
2300	156.0	0.436	-0.010	0.248
2490	1041.0	1.263	-0.153	0.431
2600	144.0	0.412	0.288	0.169
2700	279.0	0.713	-0.059	0.322
3100	114.0	0.655	-0.172	0.249
3200	40.0	-0.568	-1.152	0.213
3300	63.0	-0.089	-0.628	0.083
3700	3151.0	0.575	0.057	0.246
3800	1529.0	0.742	0.064	0.330
3900	552.0	0.579	0.116	0.236
4000	2174.0	0.701	-0.077	0.303
4100	1962.0	0.405	0.062	0.193
4200	1055.0	0.455	0.039	0.204
4300	2157.0	0.668	0.048	0.297
4600	18.0	-0.023	-0.751	0.149
4700	45.0	0.561	-0.391	0.289
5100	13.0	0.728	0.239	0.233
5200	165.0	1.005	-0.165	0.425
5410	254.0	1.253	-0.146	0.480
5500	205.0	0.795	-0.552	0.457
5610	398.0	0.634	-0.125	0.380
5700	110.0	0.654	0.018	0.388
5800	196.0	0.879	-0.047	0.349
6200	1502.0	1.050	-0.219	0.537
6600	1152.0	0.420	0.270	0.196
6810	310.0	0.389	0.481	0.086
6400	544.0	0.665	0.312	0.331
6500	578.0	0.881	-0.143	0.414
6520	327.0	-0.072	0.008	0.043
6600	409.0	0.577	0.150	0.279
6700	0.0	999.000	999.000	999.000
6704	344.0	1.021	-0.150	0.422
6704	0.0	999.000	999.000	999.000
6705	309.0	0.863	-0.068	0.387

-6705	0.0	999.000	999.000	999.000
6706	658.0	0.686	-0.463	0.404
-6706	0.0	999.000	999.000	999.000
6800	1171.0	0.687	-0.044	0.351
6900	0.0	999.000	999.000	999.000
6901	1131.0	0.780	-0.004	0.330
-6901	0.0	999.000	999.000	999.000
6902	1006.0	0.745	-0.061	0.335
-6902	0.0	999.000	999.000	999.000
6903	375.0	0.572	0.204	0.310
-6903	0.0	999.000	999.000	999.000
7000	220.0	0.765	-0.340	0.416
7100	284.0	0.499	-0.025	0.339
7200	141.0	0.658	0.141	0.324
7300	569.0	0.501	-0.153	0.268
7400	507.0	0.732	-0.229	0.389
7500	0.0	999.000	999.000	999.000
7501	57.0	0.511	-0.457	0.325
-7501	0.0	999.000	999.000	999.000
7502	86.0	0.229	-0.261	0.163
-7502	0.0	999.000	999.000	999.000
7503	116.0	0.430	-0.179	0.167
-7503	0.0	999.000	999.000	999.000
7600	208.0	0.340	0.021	0.232
8000	2953.0	0.752	-0.186	0.357
8300	223.0	0.550	-0.114	0.272

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E5

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	32509.0	0.719	0.009	0.180
100	799.0	-0.414	-0.348	0.081
150	0.0	999.000 *	999.000	999.000
200	476.0	0.203	-0.688	0.137
250	194.0	0.355	-0.810	0.187
300	804.0	0.403	-0.693	0.206
350	165.0	0.429	-0.058	0.231
401	373.0	0.654	-0.394	0.277
404	532.0	0.317	-0.331	0.151
450	134.0	0.034	-0.397	0.066
500	307.0	0.371	-0.382	0.148
600	0.0	999.000	999.000	999.000
601	66.0	0.313	-0.613	0.179
-601	0.0	999.000	999.000	999.000
602	136.0	0.527	-0.832	0.240
604	473.0	-0.150	-0.888	0.085
-604	0.0	999.000	999.000	999.000
800	0.0	999.000	999.000	999.000
801	583.0	0.650	-0.447	0.305
-801	0.0	999.000	999.000	999.000
802	565.0	0.587	-0.476	0.269
-802	0.0	999.000	999.000	999.000
803	100.0	0.226	-0.346	0.113
-803	0.0	999.000	999.000	999.000
810	177.0	0.309	-0.247	0.160
900	46.0	0.234	-0.953	0.171
1000	0.0	999.000	999.000	999.000
1001	820.0	0.943	-0.268	0.266
-1001	0.0	999.000	999.000	999.000
1002	625.0	0.922	-0.499	0.278
-1002	0.0	999.000	999.000	999.000
1010	511.0	0.145	-0.187	0.129
1100	58.0	0.031	-0.505	0.142
1200	39.0	-0.517	-1.040	0.099
1400	0.0	999.000	999.000	999.000
1500	920.0	0.705	-0.468	0.240
1511	133.0	0.625	-0.751	0.265
1622	93.0	-0.175	-0.811	0.043
1633	210.0	0.770	-0.273	0.297

1644	156.3	0.477	-0.082	0.166
1655	64.0	0.381	-0.019	0.143
1666	71.0	-0.007	-0.492	0.079
1700	1007.0	0.235	-0.070	0.134
1750	43.0	-4.446	-3.327	0.681
1800	647.0	0.203	0.006	0.114
1900	148.0	0.400	-0.031	0.177
2000	923.0	0.411	-0.232	0.137
2100	174.0	0.558	0.230	0.143
2200	1708.0	2.164	-1.077	0.246
2300	105.0	0.091	-0.398	0.129
2490	765.0	0.559	-0.264	0.115
2600	53.0	0.351	-0.211	0.159
2700	56.0	0.403	-0.312	0.199
3100	95.0	-0.597	-1.058	0.096
3200	25.0	-0.060	-0.339	0.044
3300	27.0	0.256	-0.563	0.203
3700	5171.0	0.662	-0.321	0.239
3800	656.0	0.597	-0.373	0.200
3900	318.0	0.385	-0.255	0.143
4000	1067.0	0.705	-0.649	0.282
4100	1568.0	0.527	-0.173	0.194
4200	735.0	0.427	-0.335	0.175
4300	1171.0	0.569	-0.386	0.219
4600	15.0	0.923	-0.454	0.341
4700	32.0	-0.899	-1.375	0.148
5100	15.0	-0.064	-0.389	0.121
5300	61.0	0.605	-0.409	0.217
5410	41.0	0.814	-0.268	0.291
5500	70.0	0.922	-0.576	0.309
5600	243.0	0.387	-0.104	0.146
5700	61.0	0.909	0.155	0.226
5800	130.0	0.535	0.094	0.145
6200	742.0	0.671	-0.330	0.263
6300	525.0	0.004	-0.113	0.198
6310	259.0	0.246	-0.288	0.108
6400	351.0	0.226	-0.403	0.124
6500	582.0	0.335	-0.251	0.143
6520	121.0	1.183	0.068	0.365
6600	299.0	0.389	-0.278	0.150
6700	0.0	999.000	999.000	999.000
6704	154.0	0.009	-0.567	0.114
6704	0.0	999.000	999.000	999.000
6705	166.0	0.141	-0.578	0.127

-6705	0.0	999.000	999.000	999.000
6706	181.0	-0.057	-0.546	0.101
-6706	0.0	999.000	999.000	999.000
6800	858.0	0.344	-0.194	0.138
6900	0.0	999.000	999.000	999.000
6901	716.0	0.370	-0.305	0.148
-6901	0.0	999.000	999.000	999.000
6902	614.0	0.429	-0.193	0.149
-6902	0.0	999.000	999.000	999.000
6903	225.0	0.252	-0.886	0.183
-6903	0.0	999.000	999.000	999.000
7000	169.0	0.066	-0.692	0.126
7100	149.0	0.347	0.349	0.134
7200	105.0	0.406	-1.052	0.249
7300	211.0	0.496	-0.059	0.138
7400	124.0	0.782	-0.287	0.296
7500	0.0	999.000	999.000	999.000
7501	53.0	0.547	0.220	0.130
-7501	0.0	999.000	999.000	999.000
7502	45.0	0.614	0.192	0.238
-7502	0.0	999.000	999.000	999.000
7503	59.0	0.729	0.006	0.135
-7503	0.0	999.000	999.000	999.000
7800	45.0	0.802	0.350	0.295
8000	1369.0	0.901	-0.239	0.378
8300	99.0	1.066	-0.264	0.593

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E6

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	1491.0	1.517	-0.122	0.189
100	456.0	1.440	-0.411	0.238
150	64.0	-1.225	-1.212	0.179
200	133.0	0.459	-0.220	0.130
250	146.0	1.663	-0.576	0.233
300	166.0	0.360	0.030	0.121
350	102.0	0.823	-0.142	0.188
401	75.0	1.071	-0.239	0.353
404	165.0	0.836	-0.623	0.286
450	55.0	-0.467	-0.840	0.206
500	96.0	1.916	-0.669	0.335
600	0.0	999.000*	999.000	999.000
601	34.0	0.265	-0.914	0.141
-601	0.0	999.000	999.000	999.000
602	70.0	1.078	-0.078	0.193
604	305.0	0.227	-0.246	0.064
-604	0.0	999.000	999.000	999.000
800	0.0	999.000	999.000	999.000
801	134.0	0.728	-0.321	0.249
-801	0.0	999.000	999.000	999.000
802	162.0	1.121	-0.028	0.302
-802	0.0	999.000	999.000	999.000
803	71.0	0.220	-0.905	0.172
-803	0.0	999.000	999.000	999.000
810	94.0	0.444	-0.536	0.233
900	14.0	-0.136	-2.686	0.338
1000	0.0	999.000	999.000	999.000
1001	0.0	999.000	999.000	999.000
-1001	195.0	0.938	-0.068	0.254
1002	0.0	999.000	999.000	999.000
-1002	194.0	0.615	-0.108	0.218
1010	95.0	0.995	-0.072	0.266
1100	19.0	2.113	0.388	0.366
1200	8.0	-0.812	-1.112	0.266
1400	31.0	-3.021	-3.140	0.402
1500	295.0	2.480	-1.201	0.419
1611	92.0	0.627	-0.582	0.284
1622	13.0	-1.253	-0.658	0.290
1633	27.0	1.300	-1.212	0.300

1644	51.0	0.655	-0.552	0.330
1655	11.0	1.103	0.182	0.252
1666	12.0	1.012	-0.169	0.231
1700	269.0	1.419	-0.278	0.236
1750	7.0	0.744	-2.510	0.546
1800	365.0	1.604	-0.438	0.259
1900	34.0	1.220	-1.132	0.280
2000	647.0	1.551	-0.568	0.215
2100	104.0	1.040	-1.047	0.240
2200	713.0	1.292	-0.778	0.130
2300	46.0	1.030	0.014	0.201
2490	259.0	1.198	-0.357	0.179
2600	12.0	2.480	-0.572	0.393
2700	17.0	1.843	-2.168	0.352
3100	24.0	0.953	-0.369	0.183
3200	6.0	2.879	-3.821	0.426
3300	20.0	-2.216	-0.671	0.370
3700	1292.0	0.712	-0.070	0.233
3800	480.0	0.979	-0.221	0.151
3900	128.0	1.395	-0.492	0.221
4000	550.0	0.934	-0.134	0.172
4100	636.0	0.897	-0.229	0.148
4200	266.0	0.971	-0.249	0.102
4300	457.0	0.495	-0.255	0.138
4600	14.0	-0.372	-1.635	0.161
4700	10.0	-0.059	-2.231	0.277
5100	7.0	0.416	-0.757	0.197
5300	21.0	2.720	-0.498	0.302
5410	57.0	-0.117	-1.635	0.128
5500	28.0	0.422	-0.589	0.142
5600	14.0	0.766	-0.227	0.153
5700	19.0	0.007	-0.922	0.112
5800	33.0	1.592	-0.508	0.278
6200	568.0	1.164	-0.243	0.186
6300	531.0	2.158	-0.610	0.364
6510	115.0	0.719	-0.957	0.227
6400	103.0	1.434	-0.232	0.261
6500	355.0	1.303	-0.398	0.224
6520	70.0	1.034	-0.105	0.346
6600	147.0	1.212	-0.626	0.334
6700	0.0	999.000	999.000	999.000
6704	39.0	-0.870	-2.174	0.213
6704	0.0	999.000	999.000	999.000
6705	45.0	0.738	-1.385	0.294

-6705	0.0	999.000	999.000	999.000
6706	94.0	1.965	-1.491	0.256
-6706	0.0	999.000	999.000	999.000
6800	436.0	1.607	-0.552	0.300
6900	0.0	999.000	999.000	999.000
6901	445.0	1.750	-0.672	0.247
-6901	0.0	999.000	999.000	999.000
6902	351.0	1.765	-0.613	0.268
-6902	0.0	999.000	999.000	999.000
6903	126.0	1.473	-0.608	0.312
-6903	0.0	999.000	999.000	999.000
7000	94.0	2.799	-1.797	0.340
7100	93.0	1.086	-0.470	0.239
7200	88.0	1.625	-0.932	0.335
-7300	200.0	1.926	-0.821	0.260
7400	56.0	2.965	-0.763	0.353
7500	0.0	999.000	999.000	999.000
7501	0.0	999.000	999.000	999.000
-7501	34.0	1.186	-0.981	0.256
7502	0.0	999.000	999.000	999.000
-7502	20.0	0.431	-1.104	0.321
7503	0.0	999.000	999.000	999.000
-7503	48.0	1.996	-0.836	0.294
7600	83.0	2.149	-0.990	0.330
8000	259.0	1.763	0.140	0.316
8300	56.0	2.034	-1.193	0.430

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E7

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	7112.0	1.319	-0.911	0.151
100	810.0	0.573	-0.489	0.091
150	104.0	0.994	-1.342	0.161
200	153.0	1.081	-0.873	0.177
250	22.0	1.122	-0.731	0.150
300	124.0	2.120	-1.821	0.296
350	61.0	1.052	-0.531	0.215
401	16.0	1.842	-1.196	0.349
404	19.0	1.397	-1.306	0.307
450	23.0	1.084	-0.702	0.256
500	39.0	0.022	-0.962	0.090
600	0.0	999.000*	999.000	999.000
601	32.0	3.389	-1.222	0.324
-601	0.0	999.000	999.000	999.000
602	40.0	1.258	-1.102	0.214
604	128.0	0.964	-0.539	0.095
-604	0.0	999.000	999.000	999.000
800	0.0	999.000	999.000	999.000
801	130.0	2.163	-0.992	0.403
-801	0.0	999.000	999.000	999.000
802	46.0	0.853	-1.343	0.275
-802	0.0	999.000	999.000	999.000
803	59.0	3.161	-2.134	0.465
-803	0.0	999.000	999.000	999.000
810	30.0	3.751	-1.947	0.515
900	25.0	1.682	-1.659	0.244
1000	36.0	-1.376	-2.096	0.339
1001	0.0	999.000	999.000	999.000
-1001	0.0	999.000	999.000	999.000
1002	0.0	999.000	999.000	999.000
-1002	0.0	999.000	999.000	999.000
1010	30.0	1.448	-0.872	0.389
1100	14.0	1.382	-1.783	0.319
1200	12.0	1.731	-1.516	0.284
1400	77.0	0.865	-0.606	0.106
1500	248.0	-0.137	-0.403	0.057
1611	15.0	0.822	-1.009	0.187
1622	16.0	-1.492	-0.601	0.194
1633	19.0	0.437	-0.998	0.222

1644	21.0	-0.194	-1.350	0.179
1655	16.0	0.142	-0.021	0.139
1666	4.0	0.597	-1.587	0.264
1700	257.0	0.955	-0.653	0.133
1750	15.0	3.991	-1.441	0.482
1800	206.0	0.401	-0.578	0.083
1900	10.0	-0.155	-0.054	0.073
2000	353.0	0.476	-0.438	0.071
2100	20.0	3.997	-3.279	0.518
2200	333.0	1.175	-0.797	0.166
2300	28.0	0.221	-0.916	0.146
2490	125.0	2.077	-1.342	0.252
2600	16.0	1.492	-0.892	0.196
2700	16.0	0.937	-0.017	0.173
3100	7.0	0.747	-2.070	0.211
3200	4.0	0.727	-2.169	0.247
3300	10.0	1.469	-2.874	0.246
3700	512.0	1.905	-1.362	0.304
3800	240.0	0.718	-0.605	0.133
3900	36.0	2.933	-2.487	0.347
4000	253.0	1.409	-1.023	0.184
4100	350.0	1.158	-1.199	0.235
4200	163.0	1.614	-1.459	0.251
4300	215.0	1.549	-0.812	0.209
4600	7.0	1.912	-2.803	0.323
4700	5.0	1.313	-2.594	0.293
5100	3.0	0.221	-3.711	0.365
5300	19.0	0.411	-0.648	0.119
5410	51.0	-0.057	0.696	0.073
5500	17.0	1.413	-0.528	0.201
5600	60.0	0.795	-0.522	0.122
5700	18.0	2.345	-0.335	0.252
5800	16.0	-0.466	-0.471	0.119
5200	246.0	0.700	-0.137	0.097
6300	115.0	0.776	-0.655	0.134
6310	51.0	2.751	-2.426	0.356
6400	19.0	1.111	0.171	0.163
6500	131.0	0.437	-0.398	0.084
6520	12.0	3.643	-1.397	0.460
6600	60.0	2.568	-2.127	0.293
6700	0.0	999.000	999.000	999.000
6704	35.0	2.876	-2.170	0.353
6704	0.0	999.000	999.000	999.000
6705	29.0	1.782	-1.803	0.214

-6705	0.0	999.000	999.000	999.000
6706	42.0	-0.402	-0.692	0.153
-6706	0.0	999.000	999.000	999.000
6800	173.0	0.690	-0.842	0.119
6900	0.0	999.000	999.000	999.000
6901	133.0	0.099	-0.661	0.044
-6901	0.0	999.000	999.000	999.000
6902	146.0	1.551	-1.331	0.243
-6902	0.0	999.000	999.000	999.000
6903	20.0	0.884	-1.395	0.253
-6903	0.0	999.000	999.000	999.000
7000	35.0	0.505	-0.452	0.208
7100	41.0	1.704	-1.793	0.282
7200	28.0	1.635	-1.509	0.214
7300	56.0	2.017	-1.684	0.284
7400	30.0	1.027	-0.439	0.167
7500	6.0	3.150	-2.803	0.466
7501	0.0	999.000	999.000	999.000
-7501	0.0	999.000	999.000	999.000
7502	0.0	999.000	999.000	999.000
-7502	0.0	999.000	999.000	999.000
7503	0.0	999.000	999.000	999.000
-7503	0.0	999.000	999.000	999.000
7600	32.0	0.651	-0.772	0.162
8000	263.0	2.194	-1.111	0.246
8300	30.0	-0.182	-0.332	0.138

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E8

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	1594.0	-0.246	-0.691	0.057
100	43.0	-1.944	-2.098	0.238
150	2..0	1.061	-0.317	0.153
200	10.0	0.127	-2.090	0.195
250	5.0	-0.764	-2.405	0.330
300	10.0	-1.674	-1.742	0.351
350	19.0	-0.132	-0.715	0.141
401	9.0	0....	-0.901	0.176
404	9.0	-0.778	0.100	0.177
450	4.0	-0.547	-0.953	0.231
500	18.0	-1.316	-1.104	0.279
600	0.0	999.000 *	999.000	999.000
601	0.0	999.000	999.000	999.000
-601	0.0	999.000	999.000	999.000
602	2..	-1.253	-2.427	0.317
604	0.0	999.000	999.000	999.000
-604	24.0	-1.353	-1.930	0.225
800	0.0	999.000	999.000	999.000
801	0.0	999.000	999.000	999.000
-801	20.0	1.267	-0.754	0.282
802	0.0	999.000	999.000	999.000
-802	9.0	0.503	0.565	0.242
803	0.0	999.000	999.000	999.000
-803	4.0	-0.414	-3.063	0.207
810	2.0	-1.305	-2.580	0.436
900	4.0	-1.107	-3.636	0.251
1000	55.0	-4.135	-3.358	0.579
1001	0.0	999.000	999.000	999.000
-1001	0.0	999.000	999.000	999.000
1002	0.0	999.000	999.000	999.000
-1002	0.0	999.000	999.000	999.000
1010	4.0	-1.364	-0.961	0.265
1100	1.0	2.397	-3.580	0.739
1200	3.0	-3.044	-4.165	0.776
1400	22.0	-0.243	-0.512	0.083
1500	47.0	-1.400	0.261	0.192
1611	5.0	-0.404	-0.016	0.151
1622	4.0	-1.749	-2.339	0.469
1633	5.0	0.507	-1.040	0.293

1644	4.0	-1.221	-2.844	0.540
1655	10.0	-0.466	-1.375	0.262
1666	2.0	0.506	-2.083	0.293
1700	43.0	-0.761	-1.006	0.210
1750	10.0	0.566	0.006	0.251
1800	24.0	-0.710	-1.283	0.238
1900	8.0	-1.537	-0.419	0.184
2000	45.0	-1.015	-1.073	0.255
2100	3.0	0.937	-2.106	0.279
2200	81.0	-0.739	-0.902	0.143
2300	4.0	0.592	-1.106	0.230
2490	44.0	-0.936	-1.192	0.163
2600	7.0	2.488	-2.096	0.428
2700	2.0	1.111	-4.452	0.513
3100	1.0	-2.772	-4.738	0.705
3200	0.0	999.000	999.000	999.000
3300	3.0	2.309	-2.105	0.309
3700	104.0	0.307	-0.352	0.089
3800	35.0	-0.427	-1.398	0.109
3900	9.0	-1.457	-1.454	0.340
4000	65.0	-0.203	-0.323	0.087
4100	66.0	0.226	-0.732	0.087
4200	20.0	-0.373	-0.796	0.145
4300	48.0	0.019	-0.746	0.106
4600	2.0	0.053	-1.651	0.233
4700	0.0	999.000	999.000	999.000
5100	2.0	2.049	-3.472	0.436
5300	4.0	1.327	-2.658	0.286
5410	3.0	-6.546	-7.769	0.791
5500	5.0	0.183	-3.425	0.322
5600	17.0	0.400	-0.143	0.149
5700	3.0	-0.679	-4.646	0.444
5800	7.0	-1.809	-0.897	0.233
6200	97.0	0.256	-0.830	0.097
6300	26.0	-0.078	-1.499	0.112
6310	13.0	0.962	-1.502	0.259
6400	16.0	0.161	0.059	0.154
6500	10.0	-0.301	-0.652	0.144
6520	8.0	-1.190	-1.436	0.253
6600	7.0	-0.742	-2.436	0.236
6700	0.0	999.000	999.000	999.000
6704	0.0	999.000	999.000	999.000
6704	3.0	-2.122	-4.698	0.535
6705	0.0	999.000	999.000	999.000

-6705	5.0	1.460	-0.370	0.293
6706	0.0	999.000	999.000	999.000
-6706	4.0	-1.267	-1.359	0.407
6800	37.0	-0.254	-1.029	0.077
6900	0.0	999.000	999.000	999.000
6901	0.0	999.000	999.000	999.000
-6901	14.0	-0.924	-1.552	0.275
6902	0.0	999.000	999.000	999.000
-6902	17.0	-0.626	-1.053	0.209
6903	0.0	999.000	999.000	999.000
-6903	4.0	-0.262	-1.795	0.238
7000	4.0	-0.640	-1.714	0.219
7100	5.0	-0.719	-1.146	0.366
7200	5.0	-1.514	0.240	0.255
7300	7.0	-1.777	-2.956	0.459
7400	5.0	-1.076	-0.559	0.346
7500	7.0	0.837	-1.222	0.256
7501	0.0	999.000	999.000	999.000
-7501	0.0	999.000	999.000	999.000
7502	0.0	999.000	999.000	999.000
-7502	0.0	999.000	999.000	999.000
7503	0.0	999.000	999.000	999.000
-7503	0.0	999.000	999.000	999.000
7600	4.0	-0.515	-3.489	0.442
8000	45.0	-0.254	-0.357	0.106
8300	7.0	0.276	-0.541	0.152

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E9

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	453.0	-0.558	-0.924	0.089
100	6.0	0.325	0.073	0.158
150	6.0	1.216	-3.488	0.195
200	7.0	-0.293	-3.679	0.187
250	1.0	3.197	-8.119	0.626
300	6.0	-0.600	-4.601	0.272
350	1.0	-0.602	-5.168	0.631
401	6.0	2.371	-2.022	0.365
404	0.0	999.000*	999.000	999.000
450	2.0	-0.234	-8.034	0.499
500	2.0	-0.194	-3.685	0.267
600	4.0	-0.255	-0.553	0.144
601	0.0	999.000	999.000	999.000
-601	0.0	999.000	999.000	999.000
602	3.0	3.366	-7.196	0.511
604	0.0	999.000	999.000	999.000
-604	0.0	999.000	999.000	999.000
800	21.0	0.644	-0.060	0.130
801	0.0	999.000	999.000	999.000
-801	0.0	999.000	999.000	999.000
802	0.0	999.000	999.000	999.000
-802	0.0	999.000	999.000	999.000
803	0.0	999.000	999.000	999.000
-803	0.0	999.000	999.000	999.000
810	0.0	999.000	999.000	999.000
900	2.0	5.587	-14.602	0.583
1000	21.0	-0.695	-4.555	0.472
1001	0.0	999.000	999.000	999.000
-1001	0.0	999.000	999.000	999.000
1002	1.0	999.000	999.000	999.000
-1002	0.0	999.000	999.000	999.000
1010	1.0	5.492	-8.405	0.734
1100	1.0	2.994	-7.120	0.410
1200	1.0	7.755	-10.610	0.771
1400	9.0	0.293	-1.158	0.098
1500	16.0	0.041	-2.365	0.142
1611	5.0	1.934	-6.365	0.295
1622	1.0	4.395	-8.751	0.520
1633	4.0	3.710	-6.922	0.618

1600	2.0	3.479	-10.272	0.505
1650	3.0	6.204	-8.385	0.609
1800	5.0	7.166	-6.530	0.407
1700	10.0	-2.020	-3.581	0.287
1750	2.0	2.253	-8.077	0.466
1800	9.0	0.577	-3.333	0.163
1900	6.0	1.268	-5.177	0.225
2000	9.0	-1.567	-3.113	0.313
2100	1.0	-2.204	-7.665	0.816
2200	30.0	-0.356	-2.736	0.167
2300	2.0	2.820	-11.360	0.428
2450	10.0	0.969	-3.969	0.193
2600	3.0	3.229	-8.121	0.346
2700	2.0	14.403	-23.232	0.891
2900	1.0	-7.478	-11.679	0.799
3200	1.0	7.350	-12.281	0.598
3300	4.0	0.298	-4.895	0.344
3700	34.0	-0.341	0.905	0.110
3800	9.0	-0.133	-3.635	0.177
3900	7.0	3.143	-5.475	0.347
4000	21.0	0.969	-1.778	0.064
4100	31.0	-0.036	-2.149	0.072
4200	3.0	-2.595	-7.061	0.457
4300	21.0	0.401	-3.193	0.145
4600	0.0	999.000	999.000	999.000
4700	1.0	9.551	-12.149	0.755
5100	0.0	999.000	999.000	999.000
5300	2.0	7.519	-15.356	0.713
5410	1.0	2.819	-9.278	0.504
5500	1.0	7.143	-10.794	0.755
5600	5.0	2.236	-5.797	0.313
5700	2.0	4.644	-11.641	0.558
5800	0.0	999.000	999.000	999.000
6200	19.0	-1.018	-2.796	0.273
6300	21.0	-0.721	-2.648	0.194
6310	4.0	1.811	-5.050	0.222
6400	2.0	2.003	-8.127	0.593
6500	4.0	0.735	-6.425	0.335
6520	3.0	1.743	-1.377	0.269
6600	3.0	2.360	-5.007	0.217
6700	3.0	-0.495	-1.578	0.197
6704	3.0	999.000	999.000	999.000
6704	0.0	999.000	999.000	999.000
6705	0.0	999.000	999.000	999.000

-6705	0.0	999.000	999.000	999.000
6706	0.0	999.000	999.000	999.000
-6706	0.0	999.000	999.000	999.000
6800	8.0	0.323	-3.885	0.172
6900	17.0	-2.956	-0.443	0.422
6901	0.0	999.000	999.000	999.000
-6901	0.0	999.000	999.000	999.000
6902	0.0	999.000	999.000	999.000
-6902	0.0	999.000	999.000	999.000
6903	0.0	999.000	999.000	999.000
-6903	0.0	999.000	999.000	999.000
7000	1.0	7.469	-13.124	0.589
7100	1.0	0.765	-7.327	0.574
7200	1.0	1.244	-6.334	0.534
7300	2.0	4.292	-5.044	0.561
7400	3.0	1.442	-4.441	0.209
7500	3.0	0.547	-3.222	0.336
7501	0.0	999.000	999.000	999.000
-7501	0.0	999.000	999.000	999.000
7502	0.0	999.000	999.000	999.000
-7502	0.0	999.000	999.000	999.000
7503	0.0	999.000	999.000	999.000
-7503	0.0	999.000	999.000	999.000
7600	1.0	2.513	-9.523	0.490
8000	11.0	-0.537	-2.140	0.197
8300	2.0	1.412	-10.429	0.508

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

2. Advancement Model Errors

PAYGRADE E4

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	54345.0	0.349	0.232	0.143
100	2060.0	0.397	-0.065	0.164
200	787.0	0.269	0.035	0.119
250	386.0	0.355	0.070	0.124
300	1269.0	0.247	0.385	0.088
350	310.0	-0.262	0.067	0.197
401	450.0	0.012	0.291	0.113
404	360.0	-0.077	0.321	0.184
450	227.0	0.377	0.251	0.142
500	419.0	0.385	0.210	0.151
600	0.0	999.000*	999.000	999.000
601	105.0	0.278	0.462	0.191
-601	0.0	999.000	999.000	999.000
602	179.0	0.688	0.265	0.281
604	671.0	0.685	0.587	0.230
-604	0.0	999.000	999.000	999.000
800	0.0	999.000	999.000	999.000
801	624.0	0.074	0.410	0.110
-801	0.0	999.000	999.000	999.000
802	438.0	-0.115	0.038	0.091
-802	0.0	999.000	999.000	999.000
803	200.0	-0.079	0.128	0.100
-803	0.0	999.000	999.000	999.000
810	406.0	-0.116	-0.079	0.113
900	71.0	0.463	0.053	0.202
1000	0.0	999.000	999.000	999.000
1001	963.0	-0.240	-0.089	0.225
-1001	0.0	999.000	999.000	999.000
1002	885.0	-0.088	0.288	0.167
-1002	0.0	999.000	999.000	999.000
1010	344.0	-0.271	-0.042	0.263
1100	58.0	0.562	-0.120	0.264
1200	42.0	0.448	-0.107	0.301
1500	2522.0	0.212	0.221	0.089
1611	169.0	0.140	0.428	0.079
1622	146.0	0.322	-0.196	0.250
1633	131.0	-0.300	-0.180	0.274
1644	304.0	0.165	0.037	0.158
1655	173.0	0.395	0.249	0.166
1666	124.0	0.321	0.286	0.105

1700	1341.0	0.574	0.017	0.244
1750	0.0	999.000	999.000	999.000
1800	1025.0	0.306	-0.118	0.261
1400	0.0	999.000	999.000	999.000
1900	420.0	0.312	-0.258	0.275
2000	1548.0	0.328	0.002	0.180
150	0.0	999.000	999.000	999.000
2100	329.0	-0.110	-0.094	0.213
2200	2911.0	1.605	-0.252	0.275
2300	136.0	0.238	-0.079	0.244
2490	1041.0	0.187	0.080	0.080
2600	144.0	0.447	0.369	0.202
2700	279.0	0.637	0.243	0.244
3100	114.0	0.560	-0.072	0.238
3200	40.0	-0.578	0.486	0.545
3300	63.0	-0.268	1.102	0.460
3600	0.0	999.000	999.000	999.000
3700	3151.0	0.370	0.163	0.146
3800	1529.0	0.204	0.241	0.093
3900	552.0	0.351	0.173	0.134
4000	2194.0	0.095	0.054	0.056
4100	1962.0	0.252	0.088	0.126
4200	1035.0	0.409	0.184	0.144
4300	2137.0	0.302	0.222	0.117
4600	18.0	-0.116	-0.363	0.083
4700	46.0	0.516	-0.123	0.250
5000	0.0	999.000	999.000	999.000
5100	13.0	0.227	0.036	0.190
5300	135.0	0.661	0.007	0.275
5410	264.0	0.700	0.065	0.294
5500	203.0	0.203	-0.664	0.284
5600	398.0	0.542	-0.060	0.289
5700	116.0	0.538	0.213	0.305
5800	196.0	0.568	0.338	0.282
6000	0.0	999.000	999.000	999.000
6200	1602.0	0.251	0.225	0.123
6300	1152.0	0.263	0.306	0.108
6310	310.0	0.024	0.565	0.121
6400	544.0	0.362	0.361	0.238
6500	878.0	0.412	0.053	0.177
6520	327.0	-0.155	0.097	0.123
6600	409.0	0.383	0.268	0.208
6700	0.0	999.000	999.000	999.000
6704	344.0	0.502	0.056	0.190

-6704	0.C	999.000	999.000	999.000
6705	309.0	0.140	-0.197	0.189
-6705	0.C	999.000	999.000	999.000
6706	658.C	C.228	-0.268	0.178
-6706	0.0	999.000	999.000	999.000
6800	1171.C	C.436	0.148	0.221
6900	0.C	999.000	999.000	999.000
6901	1131.0	0.416	0.157	0.160
-6901	0.C	999.000	999.000	999.000
6902	1008.0	0.448	0.116	0.164
-6902	0.0	999.000	999.000	999.000
6903	575.C	C.314	0.227	0.224
-6903	0.0	999.000	999.000	999.000
7000	220.C	0.431	0.065	0.242
7100	284.C	0.309	0.083	0.260
7200	141.C	C.593	C.293	0.201
7300	589.C	C.070	-0.084	0.149
7400	507.0	0.511	-0.089	0.262
7500	0.0	999.000	999.000	999.000
7501	57.C	C.422	-0.143	0.259
-7501	0.0	999.000	999.000	999.000
7502	66.C	C.313	C.C60	0.140
-7502	0.0	999.000	999.000	999.000
7503	116.0	0.042	-C.151	0.145
-7503	C.C	999.000	999.000	999.000
7600	208.0	-0.053	-0.029	0.184
7600	0.0	999.000	999.000	999.000
8000	2958.C	C.436	-0.016	0.187
8300	225.C	0.197	-0.579	0.297

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E5

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	32509.0	0.756	0.177	0.260
100	799.0	0.376	-0.309	0.201
200	476.0	0.677	-0.406	0.343
250	194.0	0.348	-0.196	0.261
300	804.0	0.602	-0.454	0.357
350	165.0	0.339	0.480	0.091
401	373.0	0.390	-0.072	0.172
404	382.0	0.060	0.040	0.024
450	134.0	0.359	0.185	0.152
500	307.0	0.988	0.200	0.315
600	0.0	999.000 *	999.000	999.000
601	66.0	1.193	-0.078	0.329
-601	0.0	999.000	999.000	999.000
602	106.0	0.913	-0.157	0.333
604	473.0	0.165	-0.661	0.220
-604	0.0	999.000	999.000	999.000
800	0.0	999.000	999.000	999.000
801	383.0	0.481	0.010	0.196
-801	0.0	999.000	999.000	999.000
802	365.0	-0.103	-0.245	0.098
-802	0.0	999.000	999.000	999.000
803	100.0	-0.032	0.522	0.261
-803	0.0	999.000	999.000	999.000
810	177.0	-0.023	0.270	0.176
900	48.0	0.872	-0.460	0.289
1000	0.0	999.000	999.000	999.000
1001	320.0	0.666	-0.046	0.199
-1001	0.0	999.000	999.000	999.000
1002	825.0	0.733	-0.291	0.259
-1002	0.0	999.000	999.000	999.000
1010	311.0	-0.062	-0.157	0.127
1100	58.0	1.289	-0.424	0.369
1200	39.0	0.638	-0.373	0.380
1500	920.0	0.602	0.046	0.231
1611	155.0	1.213	-0.523	0.483
1622	93.0	0.250	0.156	0.140
1633	210.0	-0.008	0.041	0.067
1644	156.0	0.451	0.235	0.171
1655	84.0	0.608	0.320	0.150
1666	71.0	0.333	0.192	0.193

1700	1007.0	0.785	0.060	0.270
1750	43.0	0.049	-0.582	0.202
1800	347.0	0.093	-0.259	0.246
1400	0.0	999.000	999.000	999.000
1900	148.0	-0.218	0.028	0.196
2000	929.0	0.379	-0.220	0.273
150	0.0	999.000	999.000	999.000
2100	174.0	-0.147	0.224	0.152
2200	1708.0	2.995	-1.337	0.404
2300	108.0	0.639	-0.059	0.292
2490	765.0	0.397	-0.761	0.151
2600	53.0	0.128	-0.234	0.149
2700	56.0	0.284	-0.451	0.266
3100	56.0	0.755	-0.335	0.302
3200	25.0	1.251	0.096	0.355
3300	27.0	0.000	1.199	0.444
3600	0.0	999.000	999.000	999.000
3700	3171.0	0.286	-0.222	0.189
3800	656.0	0.590	-0.173	0.330
3900	318.0	0.829	-0.079	0.307
4000	1067.0	0.613	-0.440	0.363
4100	1368.0	0.276	-0.155	0.164
4200	765.0	0.580	-0.155	0.246
4300	1171.0	0.734	-0.378	0.360
4600	15.0	0.987	-0.001	0.210
4700	32.0	0.123	-0.578	0.266
5000	0.0	999.000	999.000	999.000
5100	15.0	-0.398	-0.228	0.197
5300	81.0	0.594	-0.060	0.213
5410	41.0	-0.491	1.005	0.263
5500	78.0	0.270	0.093	0.127
5600	213.0	0.546	-0.161	0.234
5700	61.0	1.189	0.529	0.242
5800	130.0	0.831	0.093	0.209
6000	0.0	999.000	999.000	999.000
6200	742.0	1.392	0.775	0.222
6300	525.0	0.186	0.321	0.053
6310	259.0	0.359	0.162	0.095
6400	361.0	0.382	0.199	0.196
6500	562.0	0.432	0.008	0.267
6520	151.0	1.177	0.311	0.322
6600	299.0	0.659	-0.139	0.287
6700	0.0	999.000	999.000	999.000
6704	154.0	0.629	-0.476	0.387

-6704	0.0	999.000	999.000	999.000
6705	168.0	0.428	0.062	0.226
-6705	0.0	999.000	999.000	999.000
6706	181.0	0.261	-0.466	0.187
-6706	0.0	999.000	999.000	999.000
6800	888.0	0.492	-0.089	0.287
6900	0.0	999.000	999.000	999.000
6901	716.0	0.349	-0.472	0.271
-6901	0.0	999.000	999.000	999.000
6902	614.0	0.558	-0.163	0.290
-6902	0.0	999.000	999.000	999.000
6903	225.0	0.477	-0.492	0.278
-6903	0.0	999.000	999.000	999.000
7000	169.0	0.180	-0.177	0.256
7100	149.0	0.362	0.188	0.301
7200	105.0	0.691	0.741	0.448
7300	211.0	0.362	0.014	0.177
7400	124.0	-0.060	-0.480	0.145
7500	0.0	999.000	999.000	999.000
7501	53.0	0.312	-0.260	0.275
-7501	0.0	999.000	999.000	999.000
7502	45.0	0.343	-0.159	0.294
-7502	0.0	999.000	999.000	999.000
7503	55.0	0.317	-0.508	0.169
-7503	0.0	999.000	999.000	999.000
7600	45.0	0.674	2.117	0.400
7800	0.0	999.000	999.000	999.000
8000	1369.0	0.743	0.034	0.245
8300	99.0	-0.407	0.970	0.478

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E6

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	14091.0	-0.032	-0.134	0.050
100	458.0	-0.176	-0.357	0.044
200	133.0	-0.780	-0.624	0.177
250	146.0	0.737	0.074	0.106
300	186.0	-0.235	-0.143	0.147
350	102.0	-0.328	0.081	0.177
401	75.0	-0.006	0.007	0.119
404	163.0	0.004	0.008	0.050
450	55.0	-0.332	-0.054	0.170
500	90.0	0.493	0.170	0.097
600	0.0	999.000*	999.000	999.000
601	84.0	-1.251	-1.466	0.289
-601	0.0	999.000	999.000	999.000
602	70.0	-0.063	0.569	0.118
604	303.0	-1.110	-0.217	0.160
-604	0.0	999.000	999.000	999.000
800	0.0	999.000	999.000	999.000
801	184.0	0.245	-0.252	0.183
-801	0.0	999.000	999.000	999.000
802	162.0	0.800	0.448	0.148
-802	0.0	999.000	999.000	999.000
803	71.0	0.171	-0.442	0.131
-803	0.0	999.000	999.000	999.000
810	84.0	-0.277	-1.199	0.207
900	14.0	-0.832	-0.836	0.224
1000	0.0	999.000	999.000	999.000
1001	0.0	999.000	999.000	999.000
-1001	195.0	0.102	-0.146	0.104
1002	0.0	999.000	999.000	999.000
-1002	194.0	-0.296	0.401**	0.140
1010	95.0	0.480	0.289	0.104
1100	19.0	0.362	0.738	0.099
1200	8.0	1.175	-0.556	0.219
1500	295.0	1.086	-0.530	0.168
1611	52.0	0.406	-0.693	0.151
1622	13.0	-0.209	-0.533	0.119
1633	27.0	0.010	0.682	0.163
1644	31.0	0.219	-0.147	0.110
1655	11.0	0.217	0.903	0.195
1666	12.0	-0.057	0.780	0.171

1700	289.0	-0.502	-0.421	0.120
1750	7.0	2.537	-0.545	0.412
1800	365.0	-1.153	-0.169	0.205
1400	31.0	-5.522	-2.651	0.903
1900	34.0	0.152	-0.915	0.138
2000	647.0	0.479	-0.131	0.075
150	64.0	-2.645	-1.111	0.339
2100	104.0	-0.379	-0.871	0.143
2200	715.0	0.446	-0.135	0.180
2300	46.0	-0.198	-0.320	0.124
2490	259.0	-0.645	-0.400	0.098
2600	12.0	0.362	-0.254	0.142
2700	17.0	0.218	-1.199	0.146
3100	24.0	-2.005	-1.342	0.289
3200	6.0	1.288	-0.370	0.289
3300	28.0	-1.242	-0.976	0.163
3600	0.0	999.000	999.000	999.000
3700	1292.0	-0.271	-0.398	0.184
3800	480.0	0.660	-0.225	0.088
3900	128.0	0.368	-0.257	0.079
4000	350.0	-0.204	0.296	0.093
4100	636.0	-0.930	-0.809	0.208
4200	266.0	-0.383	-0.447	0.130
4300	437.0	-0.970	-0.772	0.200
4600	14.0	-0.335	-1.301	0.172
4700	10.0	-0.749	-1.116	0.230
5000	0.0	999.000	999.000	999.000
5100	7.0	-0.425	-1.216	0.182
5300	21.0	1.050	0.141	0.183
5410	37.0	0.120	-2.163	0.211
5500	28.0	-0.436	0.163	0.163
5600	74.0	-0.088	-0.111	0.071
5700	18.0	-1.767	-1.152	0.301
5800	38.0	0.424	-0.379	0.107
6000	0.0	999.000	999.000	999.000
6200	586.0	0.096	0.407	0.098
6300	331.0	0.343	-0.285	0.116
6310	115.0	-0.727	-0.482	0.173
6400	103.0	-0.567	0.155	0.191
6500	355.0	0.266	0.077	0.078
6520	70.0	0.569	-0.368	0.319
6600	147.0	-1.470	-0.931	0.330
6700	0.0	999.000	999.000	999.000
6704	36.0	-2.119	-1.618	0.463

-6704	0.0	999.000	999.000	999.000
6705	45.0	-1.828	-0.886	0.265
-6705	0.0	999.000	999.000	999.000
6706	94.0	1.558	-0.900	0.235
-6706	0.0	999.000	999.000	999.000
6800	486.0	-0.809	-0.281	0.167
6900	0.0	999.000	999.000	999.000
6901	445.0	0.572	0.351	0.106
-6901	0.0	999.000	999.000	999.000
6902	351.0	-0.681	0.395	0.187
-6902	0.0	999.000	999.000	999.000
6903	126.0	0.639	-0.193	0.133
-6903	0.0	999.000	999.000	999.000
7000	94.0	0.525	0.170	0.113
7100	53.0	-0.359	0.392	0.122
7200	88.0	-1.393	-0.690	0.242
7300	200.0	0.119	0.271	0.066
7400	56.0	1.035	0.037	0.151
7500	0.0	999.000	999.000	999.000
7501	0.0	999.000	999.000	999.000
-7501	34.0	-1.148	-0.738	0.203
7502	0.0	999.000	999.000	999.000
-7502	20.0	-1.305	0.225	0.398
7503	0.0	999.000	999.000	999.000
-7503	48.0	-0.644	0.893	0.176
7600	68.0	0.584	0.092	0.104
7600	0.0	999.000	999.000	999.000
8000	259.0	0.422	0.066	0.142
8300	50.0	-0.486	-0.219	0.107

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E7

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	7112.0	0.290	-0.217	0.075
100	310.0	-0.914	-0.425	0.145
200	133.0	0.050	-0.302	0.047
250	22.0	-0.312	1.911	0.242
300	124.0	0.743	-0.355	0.127
350	61.0	0.184	0.244	0.065
401	16.0	0.069	-0.074	0.127
404	19.0	-0.299	-0.416	0.082
450	23.0	0.520	0.437	0.104
500	89.0	-0.226	-0.257	0.046
600	0.0	999.000*	999.000	999.000
601	32.0	0.954	0.171	0.231
-601	0.0	999.000	999.000	999.000
602	40.0	0.542	-0.509	0.144
604	128.0	-0.212	0.542	0.093
-604	0.0	999.000	999.000	999.000
800	0.0	999.000	999.000	999.000
801	130.0	0.033	-0.308	0.090
-801	0.0	999.000	999.000	999.000
802	49.0	0.215	-0.692	0.126
-802	0.0	999.000	999.000	999.000
803	59.0	1.294	-0.295	0.293
-803	0.0	999.000	999.000	999.000
810	30.0	2.761	-0.910	0.395
900	23.0	-0.798	-0.180	0.100
1000	101.0	-0.647	0.242	0.208
1001	0.0	999.000	999.000	999.000
-1001	0.0	999.000	999.000	999.000
1002	0.0	999.000	999.000	999.000
-1002	0.0	999.000	999.000	999.000
1010	50.0	0.347	0.166	0.064
1100	14.0	0.557	-0.172	0.188
1200	12.0	2.810	-1.657	0.370
1500	248.0	-0.267	0.303	0.062
1611	15.0	0.576	-0.917	0.155
1622	16.0	-1.385	0.244	0.231
1633	19.0	-0.849	-0.356	0.211
1644	21.0	-0.443	-1.035	0.139
1655	10.0	-0.037	-0.190	0.055
1666	8.0	0.190	-1.195	0.228

1700	257.0	-0.217	0.031	0.029
1750	15.0	2.178	0.535	0.321
1800	206.0	-0.566	0.153	0.112
1400	77.0	-0.176	0.158	0.073
1900	40.0	0.172	0.512	0.147
2000	353.0	0.485	-0.152	0.123
150	104.0	-0.627	0.195	0.130
2100	20.0	2.008	-0.508	0.460
2200	338.0	-0.435	-0.258	0.070
2300	20.0	-0.215	-0.026	0.144
2490	125.0	-0.067	0.802	0.102
2600	16.0	1.467	-0.226	0.216
2700	16.0	0.394	0.166	0.122
3100	7.0	-0.847	-1.248	0.365
3200	4.0	-0.044	1.281	0.486
3300	10.0	1.425	-2.314	0.316
3600	0.0	999.000	999.000	999.000
3700	512.0	0.775	-0.001	0.093
3800	240.0	0.275	-0.050	0.083
3900	36.0	1.013	-0.719	0.159
4000	253.0	0.939	-0.095	0.177
4100	350.0	0.143	-0.140	0.062
4200	188.0	-0.147	0.011	0.033
4300	215.0	0.108	-0.064	0.036
4600	7.0	1.956	-2.392	0.384
4700	6.0	1.278	-1.089	0.326
5000	0.0	999.000	999.000	999.000
5100	3.0	-0.229	-2.527	0.326
5300	19.0	0.463	-0.084	0.146
5410	51.0	-0.359	0.723	0.183
5500	17.0	-0.405	-1.060	0.192
5600	60.0	-0.002	-0.232	0.063
5700	18.0	0.577	0.767	0.140
5800	16.0	-1.289	-0.406	0.168
6000	0.0	999.000	999.000	999.000
6200	246.0	0.316	-0.565	0.147
6300	115.0	0.463	-0.164	0.139
6310	51.0	1.563	-1.164	0.289
6400	14.0	-0.575	0.477	0.203
6500	131.0	0.155	-0.175	0.081
6520	12.0	0.491	0.999	0.219
6600	60.0	1.259	-0.414	0.266
6700	0.0	999.000	999.000	999.000
6704	33.0	1.052	-0.076	0.245

-6704	0.0	999.000	999.000	999.000
6705	29.0	0.142	-0.024	0.090
-6705	0.0	999.000	999.000	999.000
6706	42.0	-0.244	-0.864	0.194
-6706	0.0	999.000	999.000	999.000
6800	173.0	0.747	-0.044	0.197
6900	0.0	999.000	999.000	999.000
6901	133.0	1.186	-0.877	0.251
-6901	0.0	999.000	999.000	999.000
6902	148.0	0.089	0.275	0.096
-6902	0.0	999.000	999.000	999.000
6903	20.0	0.036	-0.588	0.115
-6903	0.0	999.000	999.000	999.000
7000	35.0	0.028	0.503	0.179
7100	41.0	1.132	-0.752	0.225
7200	28.0	0.186	-0.021	0.220
7300	56.0	2.147	-1.180	0.372
7400	30.0	0.025	0.084	0.108
7500	38.0	0.836	0.109	0.237
7501	0.0	999.000	999.000	999.000
-7501	0.0	999.000	999.000	999.000
7502	0.0	999.000	999.000	999.000
-7502	0.0	999.000	999.000	999.000
7503	0.0	999.000	999.000	999.000
-7503	0.0	999.000	999.000	999.000
7600	32.0	0.734	-0.645	0.219
7800	0.0	999.000	999.000	999.000
8000	263.0	0.331	0.144	0.085
8300	30.0	-0.781	0.210	0.175

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E8

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	1394.0	0.557	0.512	0.116
100	43.0	0.772	1.773	0.442
200	10.0	0.760	0.088	0.198
250	5.0	2.920	-6.351	0.643
300	16.0	-1.223	-0.707	0.305
350	19.0	-0.243	-0.216	0.115
401	9.0	-0.089	-0.126	0.080
404	9.0	-0.063	-0.163	0.074
450	4.0	-0.139	-1.818	0.249
500	18.0	0.150	0.338	0.088
600	0.0	999.000*	999.000	999.000
601	0.0	999.000	999.000	999.000
-601	0.0	999.000	999.000	999.000
602	2.0	-4.920	-6.467	0.787
604	0.0	999.000	999.000	999.000
-604	24.0	-0.181	-1.187	0.158
800	0.0	999.000	999.000	999.000
801	0.0	999.000	999.000	999.000
-801	20.0	-0.023	-0.814	0.113
802	0.0	999.000	999.000	999.000
-802	9.0	0.665	0.988	0.220
803	0.0	999.000	999.000	999.000
-803	4.0	-0.165	-1.542	0.220
810	2.0	-1.382	-4.951	0.450
900	4.0	-0.082	-1.490	0.211
1000	36.0	-2.920	-0.853	0.623
1001	0.0	999.000	999.000	999.000
-1001	0.0	999.000	999.000	999.000
1002	0.0	999.000	999.000	999.000
-1002	0.0	999.000	999.000	999.000
1010	4.0	-2.754	-1.709	0.490
1100	1.0	3.563	-3.997	0.957
1200	3.0	-0.196	-3.624	0.408
1500	47.0	-1.542	1.564	0.392
1611	5.0	-0.141	-1.235	0.162
1622	4.0	-0.752	-1.436	0.201
1633	5.0	0.730	-1.648	0.382
1644	4.0	-0.793	-2.136	0.368
1655	10.0	0.965	-2.580	0.329
1666	2.0	1.187	-2.461	0.416

1700	43.0	-1.024	-0.567	0.265
1750	10.0	0.510	0.974	0.182
1800	24.0	0.451	-1.500	0.290
1400	22.0	0.550	-1.250	0.207
1900	8.0	-0.325	0.437	0.123
2000	45.0	0.069	-0.271	0.109
150	29.0	0.572	-0.124	0.158
2100	3.0	0.369	1.902	0.667
2200	81.0	-1.444	-0.758	0.257
2300	4.0	0.426	-0.504	0.178
2490	44.0	-0.919	0.019	0.126
2600	7.0	2.425	-1.479	0.411
2700	2.0	1.218	-3.903	0.413
3100	1.0	-0.118	-3.089	0.445
3200	0.0	999.000	999.000	999.000
3300	3.0	0.562	1.238	0.310
3600	0.0	999.000	999.000	999.000
3700	104.0	0.741	-0.689	0.154
3800	35.0	0.357	-1.265	0.124
3900	9.0	-0.863	-1.374	0.189
4000	65.0	-0.073	-0.258	0.111
4100	66.0	0.532	-0.655	0.144
4200	20.0	-0.306	-0.173	0.123
4300	46.0	-0.188	-0.113	0.099
4600	2.0	1.130	-4.170	0.398
4700	0.0	999.000	999.000	999.000
5000	0.0	999.000	999.000	999.000
5100	2.0	0.887	-3.024	0.370
5300	4.0	0.412	-1.915	0.257
5410	3.0	-5.716	-8.818	0.663
5500	3.0	0.911	-3.077	0.343
5600	17.0	0.222	1.374	0.174
5700	3.0	0.689	-7.315	0.501
5800	7.0	0.227	-1.447	0.220
6000	0.0	999.000	999.000	999.000
6200	97.0	0.050	-0.271	0.064
6300	26.0	-0.914	-1.477	0.266
6310	19.0	1.473	-0.994	0.380
6400	10.0	0.644	0.934	0.250
6500	10.0	-0.169	1.379	0.378
6520	8.0	-2.297	-0.424	0.692
6600	7.0	0.429	0.935	0.429
6700	0.0	999.000	999.000	999.000
6704	0.0	999.000	999.000	999.000

-6704	3.0	-2.396	-2.853	0.864
6705	0.0	999.000	999.000	999.000
-6705	3.0	1.014	-1.834	0.355
6706	0.0	999.000	999.000	999.000
-6706	4.0	1.939	-0.214	0.686
6800	37.0	0.619	-1.067	0.195
6900	0.0	999.000	999.000	999.000
6901	0.0	999.000	999.000	999.000
-6901	14.0	-1.571	-0.408	0.786
6902	0.0	999.000	999.000	999.000
-6902	17.0	-0.525	0.950	0.631
6903	0.0	999.000	999.000	999.000
-6903	4.0	-2.575	-2.931	0.526
7000	4.0	-0.503	-2.402	0.275
7100	5.0	0.276	-0.268	0.234
7200	5.0	-0.655	0.814	0.231
7300	7.0	-1.620	-1.705	0.426
7400	5.0	-3.196	-1.743	0.530
7500	12.0	2.462	-0.592	0.425
7501	0.0	999.000	999.000	999.000
-7501	0.0	999.000	999.000	999.000
7502	0.0	999.000	999.000	999.000
-7502	0.0	999.000	999.000	999.000
7503	0.0	999.000	999.000	999.000
-7503	0.0	999.000	999.000	999.000
7600	4.0	-0.611	-2.748	0.399
7800	0.0	999.000	999.000	999.000
8000	45.0	1.597	1.174	0.520
8300	7.0	1.054	-0.759	0.253

*NOTE: An "error" of 999.000 means that this pay grade does not exist in that rating.

PAYGRADE E9

RATE CODE	VOLUME	ERR # 1	ERR # 2	ERR # 3
0	453.0	0.437	-0.261	0.110
100	6.0	1.430	3.680	0.323
200	7.0	-1.556	-1.915	0.289
250	1.0	0.439	-3.206	0.512
300	6.0	0.698	-1.149	0.280
350	1.0	-4.503	-4.727	0.998
401	6.0	2.977	-0.546	0.551
404	0.0	999.000*	999.000	999.000
450	2.0	-1.306	-1.751	0.457
500	2.0	0.044	0.853	0.371
600	8.0	-1.613	-0.530	0.202
601	0.0	999.000	999.000	999.000
-601	0.0	999.000	999.000	999.000
602	3.0	-1.037	-3.618	0.408
604	0.0	999.000	999.000	999.000
-604	0.0	999.000	999.000	999.000
800	7.0	0.395	-1.679	0.198
801	0.0	999.000	999.000	999.000
-801	0.0	999.000	999.000	999.000
802	0.0	999.000	999.000	999.000
-802	0.0	999.000	999.000	999.000
803	0.0	999.000	999.000	999.000
-803	0.0	999.000	999.000	999.000
810	0.0	999.000	999.000	999.000
900	2.0	-0.052	-2.652	0.344
1000	11.0	0.660	-2.127	0.309
1001	0.0	999.000	999.000	999.000
-1001	0.0	999.000	999.000	999.000
1002	0.0	999.000	999.000	999.000
-1002	0.0	999.000	999.000	999.000
1010	1.0	0.262	-3.504	0.501
1100	1.0	-1.484	-2.474	0.692
1200	1.0	-0.042	-3.519	0.464
1500	16.0	-0.752	-2.105	0.287
1611	3.0	0.135	-1.836	0.295
1622	1.0	0.823	-0.910	0.821
1633	4.0	1.535	-2.166	0.594
1644	2.0	0.984	-1.558	0.495
1655	3.0	-1.182	-2.500	0.503
1666	3.0	1.758	1.406	0.331

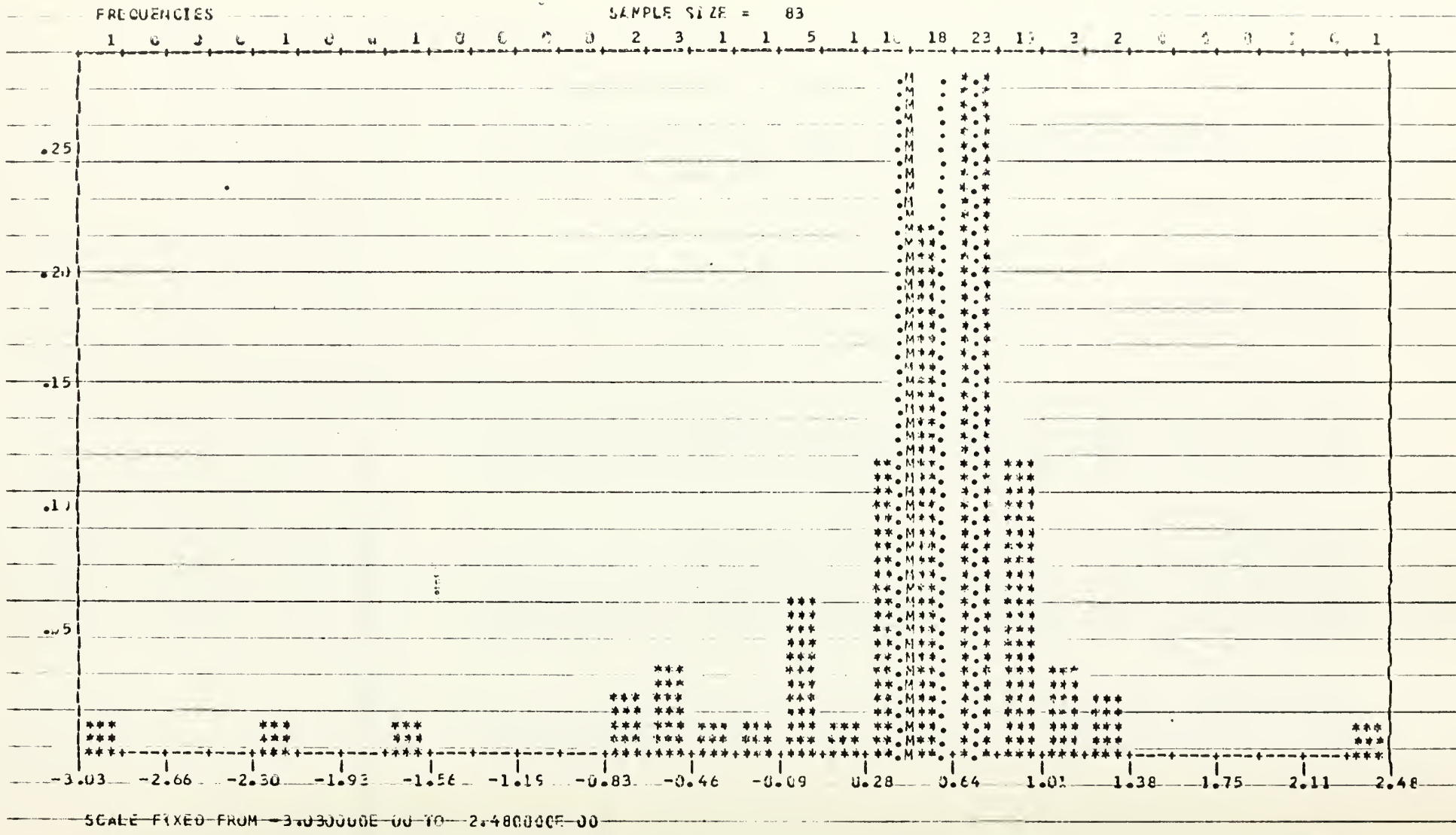
1700	16.0	-1.563	-1.116	0.216
1750	2.0	0.614	-0.286	0.493
1800	9.0	-0.112	-0.590	0.177
1400	9.0	2.799	-1.022	0.497
1900	6.0	-0.572	-1.940	0.269
2000	9.0	-0.987	-2.427	0.265
150	8.0	0.645	-0.819	0.184
2100	1.0	-3.940	-5.192	0.848
2200	30.0	-1.556	-1.145	0.247
2300	2.0	-1.932	-3.309	0.675
2490	10.0	-1.739	-0.757	0.287
2600	3.0	-1.040	-3.424	0.459
2700	2.0	7.754	-10.921	0.853
3100	1.0	-1.499	-3.258	0.636
3200	1.0	1.073	-4.518	0.575
3300	4.0	-2.101	-2.366	0.407
3600	0.0	999.000	999.000	999.000
3700	34.0	-0.202	1.646	0.096
3800	9.0	-0.319	-1.836	0.177
3900	7.0	0.305	-1.533	0.211
4000	21.0	0.708	-0.678	0.181
4100	31.0	0.455	-0.891	0.154
4200	5.0	-0.457	0.279	0.199
4300	21.0	-0.027	-1.366	0.140
4600	0.0	999.000	999.000	999.000
4700	1.0	-0.948	-1.494	0.656
5000	0.0	999.000	999.000	999.000
5100	0.0	999.000	999.000	999.000
5300	2.0	4.495	-10.777	0.731
5410	1.0	-1.762	-3.496	0.648
5500	1.0	1.731	-5.070	0.616
5600	5.0	0.166	-1.631	0.289
5700	2.0	0.872	-6.921	0.482
5800	0.0	999.000	999.000	999.000
6000	0.0	999.000	999.000	999.000
6200	15.0	2.719	-1.444	0.582
6300	21.0	-0.073	-1.523	0.150
6310	4.0	-0.476	-2.305	0.290
6400	2.0	0.253	-5.253	0.499
6500	4.0	-0.904	-2.433	0.346
6520	3.0	0.335	-0.420	0.238
6600	3.0	0.052	-0.379	0.232
6700	3.0	-1.787	-2.007	0.274
6704	0.0	999.000	999.000	999.000

-6704	0.0	999.000	999.000	999.000
6705	0.0	999.000	999.000	999.000
-6705	0.0	999.000	999.000	999.000
6706	0.0	999.000	999.000	999.000
-6706	0.0	999.000	999.000	999.000
6800	8.0	-0.793	-2.852	0.316
6900	17.0	-1.108	-2.040	0.231
6901	0.0	999.000	999.000	999.000
-6901	0.0	999.000	999.000	999.000
6902	0.0	999.000	999.000	999.000
-6902	0.0	999.000	999.000	999.000
6903	0.0	999.000	999.000	999.000
-6903	0.0	999.000	999.000	999.000
7000	1.0	-0.894	-3.534	0.552
7100	1.0	-5.192	-6.488	0.880
7200	1.0	0.743	-3.325	0.553
7300	2.0	2.088	-4.944	0.524
7400	3.0	-0.806	-1.023	0.224
7500	1.0	1.925	-2.787	0.763
7501	0.0	999.000	999.000	999.000
-7501	0.0	999.000	999.000	999.000
7502	0.0	999.000	999.000	999.000
-7502	0.0	999.000	999.000	999.000
7503	0.0	999.000	999.000	999.000
-7503	0.0	999.000	999.000	999.000
7600	1.0	0.419	-4.936	0.505
7800	0.0	999.000	999.000	999.000
8000	11.0	-0.947	-1.469	0.226
8300	2.0	-1.457	-4.705	0.532

*NOTE: An "error" of 999,000 means that this pay grade does not exist in that rating.

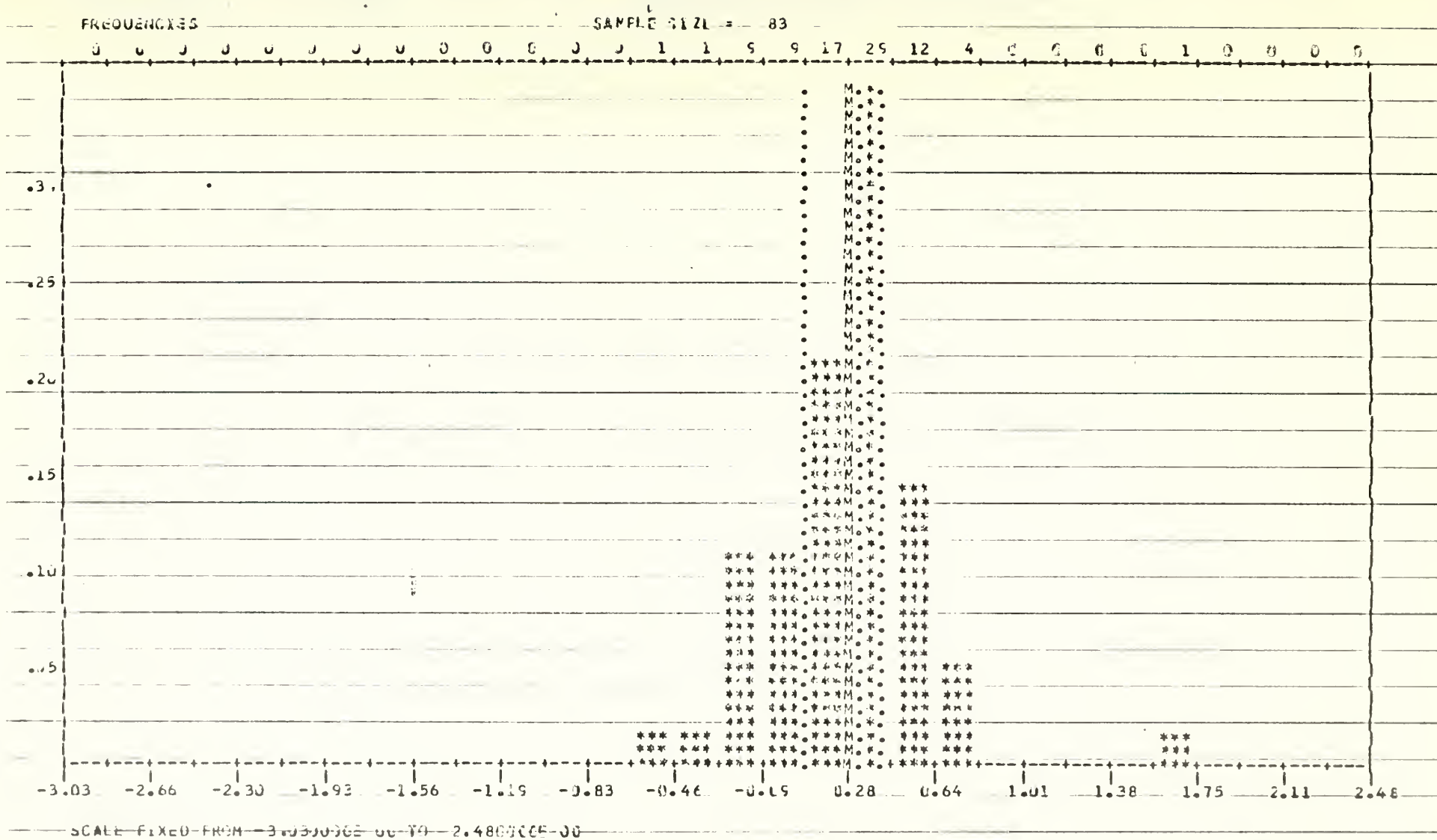
HISTOGRAMS OF Δ_1 ERRORS, ALL RATINGS, FAST MODEL AND ADVANCEMENT MODEL

Δ_1 Errors of FAST Model for Pay Grade E4



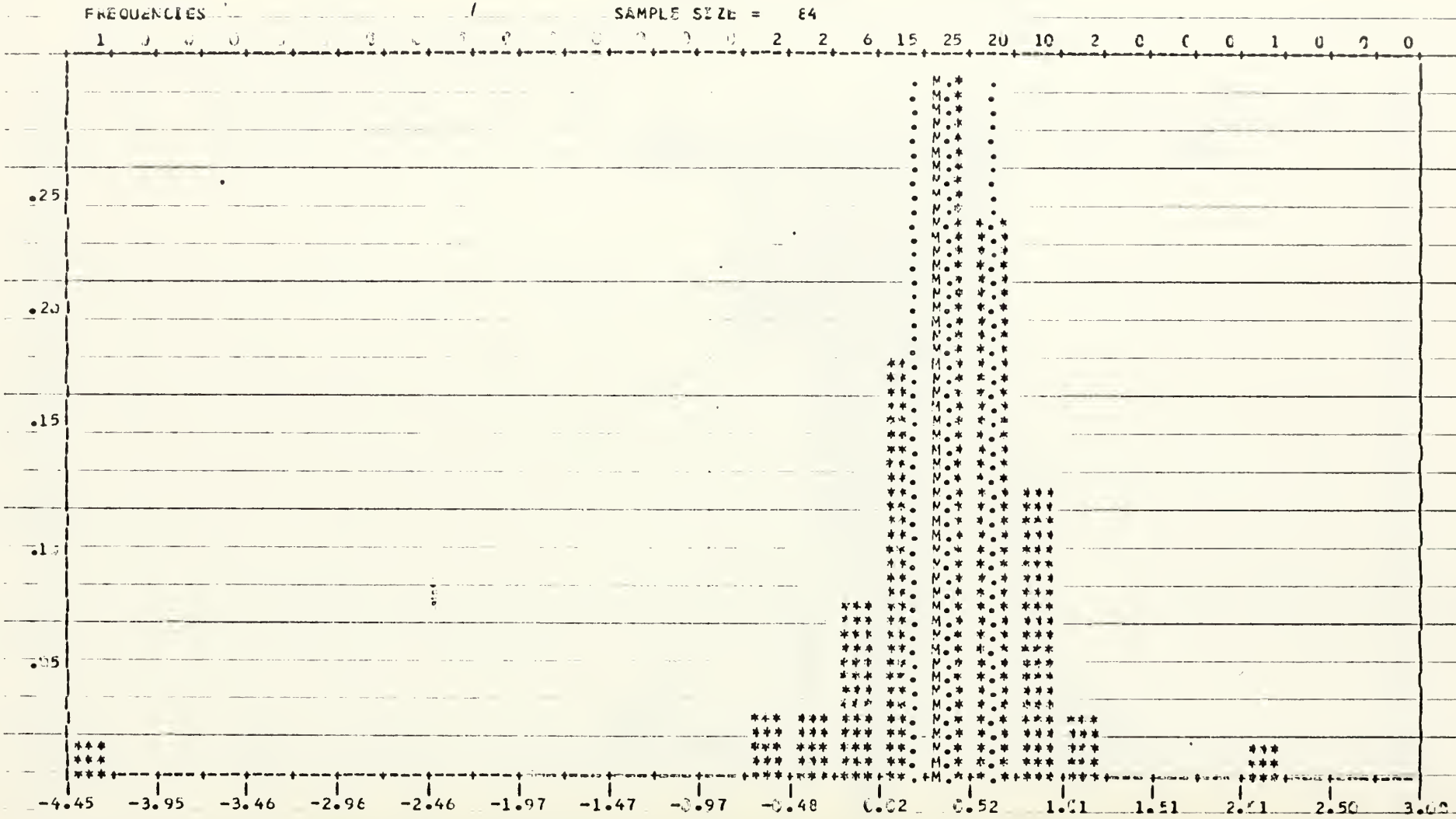
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	4.526789E-01	VARIANCE	5.165344E-01	M3	-8.336938E-01	MINIMUM	-3.315315E 00
MEDIAN	6.139431E-01	STD DEV	7.187065E-01	M4	3.064855E 00	.10 QUANTILE	-4.631233E-01
TRIMEAN	5.934644E-01	COEF VAR	1.587660E 00	SKEWNESS	-2.244674E 00	.25 QUANTILE (HINGE)	4.247108E-01
MIDMEAN	6.139514E-01	MEAN DEV	3.992268E-01	KURTOSIS	8.207525E 00		

Δ_1 Errors of Advancement Model for Pay Grade E4

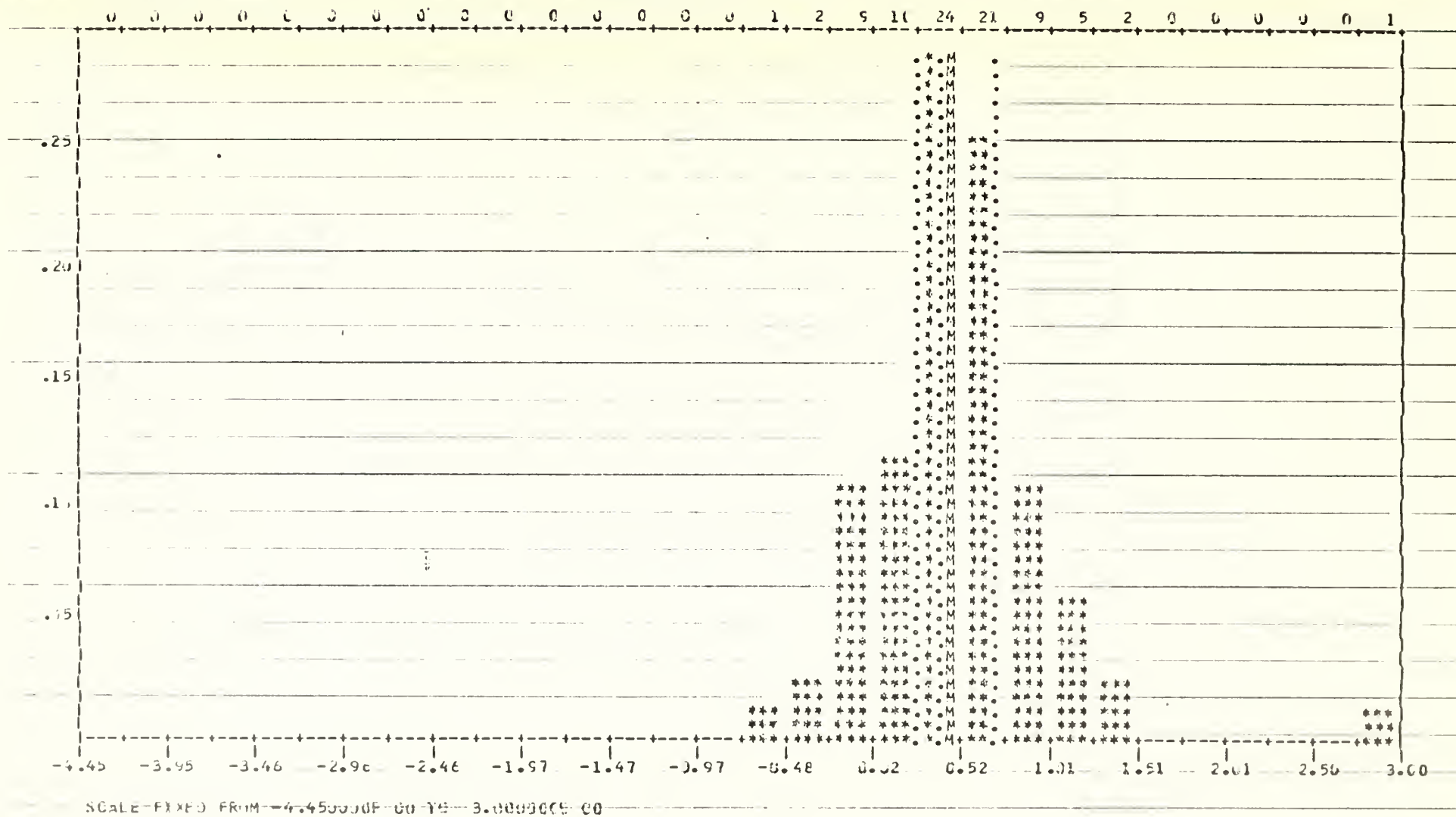


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.727731E-01	VARIANCE	9.2528485-02	M3	1.2534485-02	MINIMUM	-5.7847215-01
MEDIAN	3.116630E-01	STD DEV	3.042145E-01	M4	5.646101E-02	.10 QUANTILE	-1.157584E-01
TRIMEAN	2.887358E-01	COEF VAR	1.115217E 00	SKEWNESS	4.452696E-01	.25 QUANTILE (HINGE)	5.541512E-02
MIDMEAN	3.016683E-01	MEAN DEV	2.182618E-01	KURTOSIS	3.593317E 00	.5 QUANTILE (MEDIAN)	3.116636E-01
MIDRANGE	5.134039E-01	RANGE	2.183752E 00	BETA1	1.208507E-02	.75 QUANTILE (HINGE)	4.363809E-01
		MIDSPREAD	3.486658E-01	BETA2	5.434828E-02	.90 QUANTILE	5.681734E-01
						MAXIMUM	1.605280E 00

Δ_1 Errors of FAST Model for Pay Grade E5

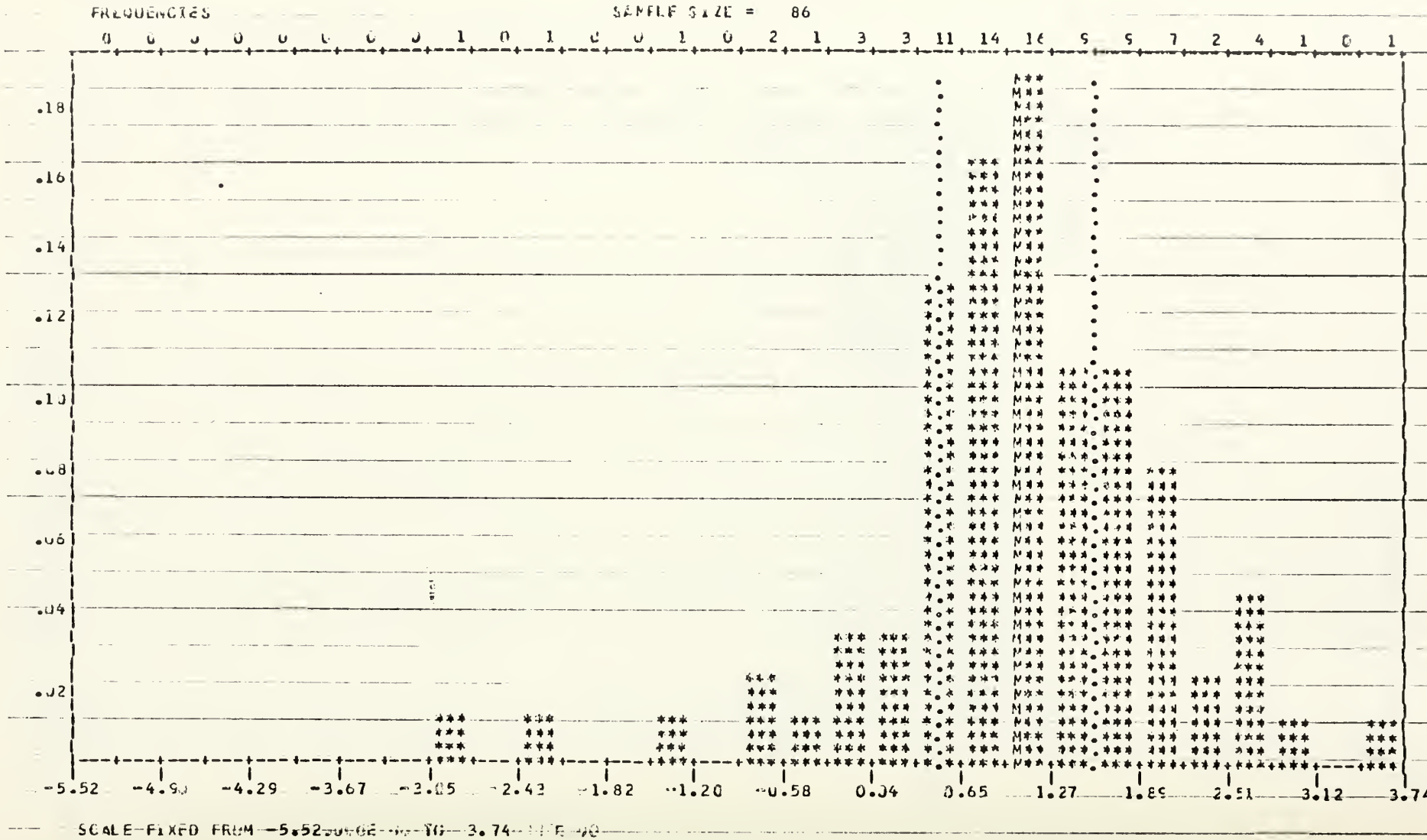


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	3.618979E-01	VARIANCE	4.488188E-01	M3	-1.311887E 00	MINIMUM	-4.448295E 00
MEDIAN	4.017420E-01	STD DEV	6.699459E-01	M4	6.864474E 00	.10 QUANTILE	-6.662273E-02
TRIMEAN	4.167445E-01	COEF VAR	1.851611E 00	SKEWNESS	-4.482355E 00	.25 QUANTILE (FENCE)	2.641667E-01
MIDMEAN	4.191043E-01	MEAN DEV	5.372222E-01	KURTOSIS	2.387500E 01		



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	4.946461E-01	VARIANCE	2.328196E-01	M3	1.8 7439E-01	MINIMUM	-4.9 676E-01
MEDIAN	4.415636E-01	STD DEV	4.825336E-01	M4	5.6047J2E-01	.10 QUANTILE	-5.5E5E3E-0
TRIMEAN	4.626634E-01	COEF VAR	9.7547265-01	SKEWNESS	1.6LE52JE 00	.25 QUANTILE (HINGE)	2.552619E-01
MIDMEAN	4.7.6 .1E-1	MEAN DEV	3.38141 E-1	KURTOSIS	7.339835E	.5 QUANTILE (MEDIAN)	4.415636E-01
MIDRANGE	1.252397E 00	RANGE	2.486146E 00	BETA1	1.742400E-01	.75 QUANTILE (HINGE)	7.122655E-01
		MIDSPREAD	4.570036E-01	BETA2	5.375885E-01	.9 QUANTILE	9.873981E-01
						MAXIMUM	2.555471E 00

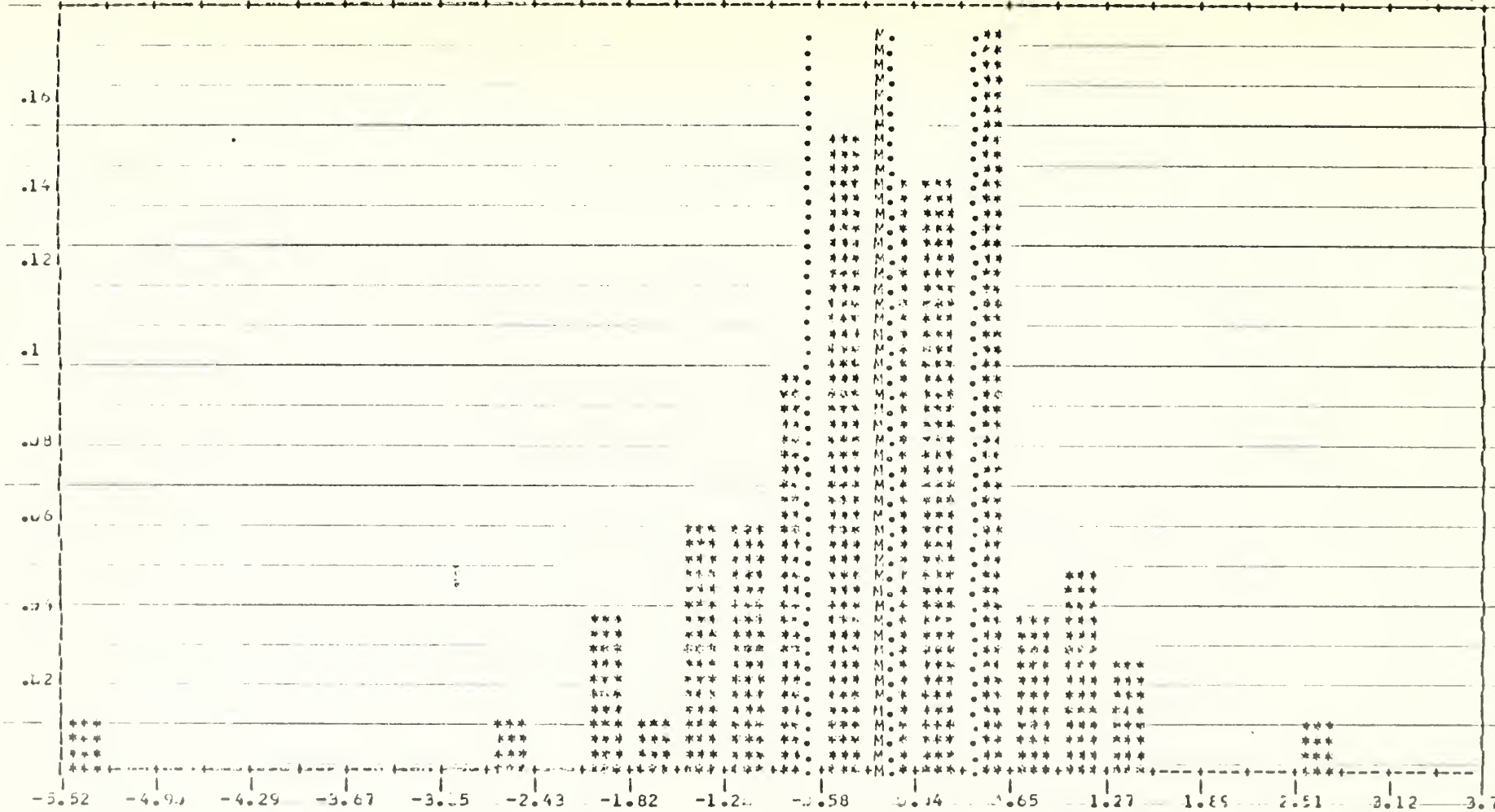
Δ_1 Errors of FAST Model for Pay Grade E6



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.054652E 00	VARIANCE	1.058174E 00	M3	-1.[illegible]5474[illegible] 00	MINIMUM	-3.[illegible]9815[illegible] 00
MEDIAN	1.074744E 00	STD DEV	1.028676E 00	M4	6.938137E [illegible]	.1% QUANTILE	-1.166485E-01
TRIMEAN	1.063791E 00	COEF VAR	9.753655E-01	SKEWNESS	-9.237[illegible]E-01	.25 QUANTILE (MEDIAN)	[illegible]

Δ_1 Errors of Advancement Model for Pay Grade E6

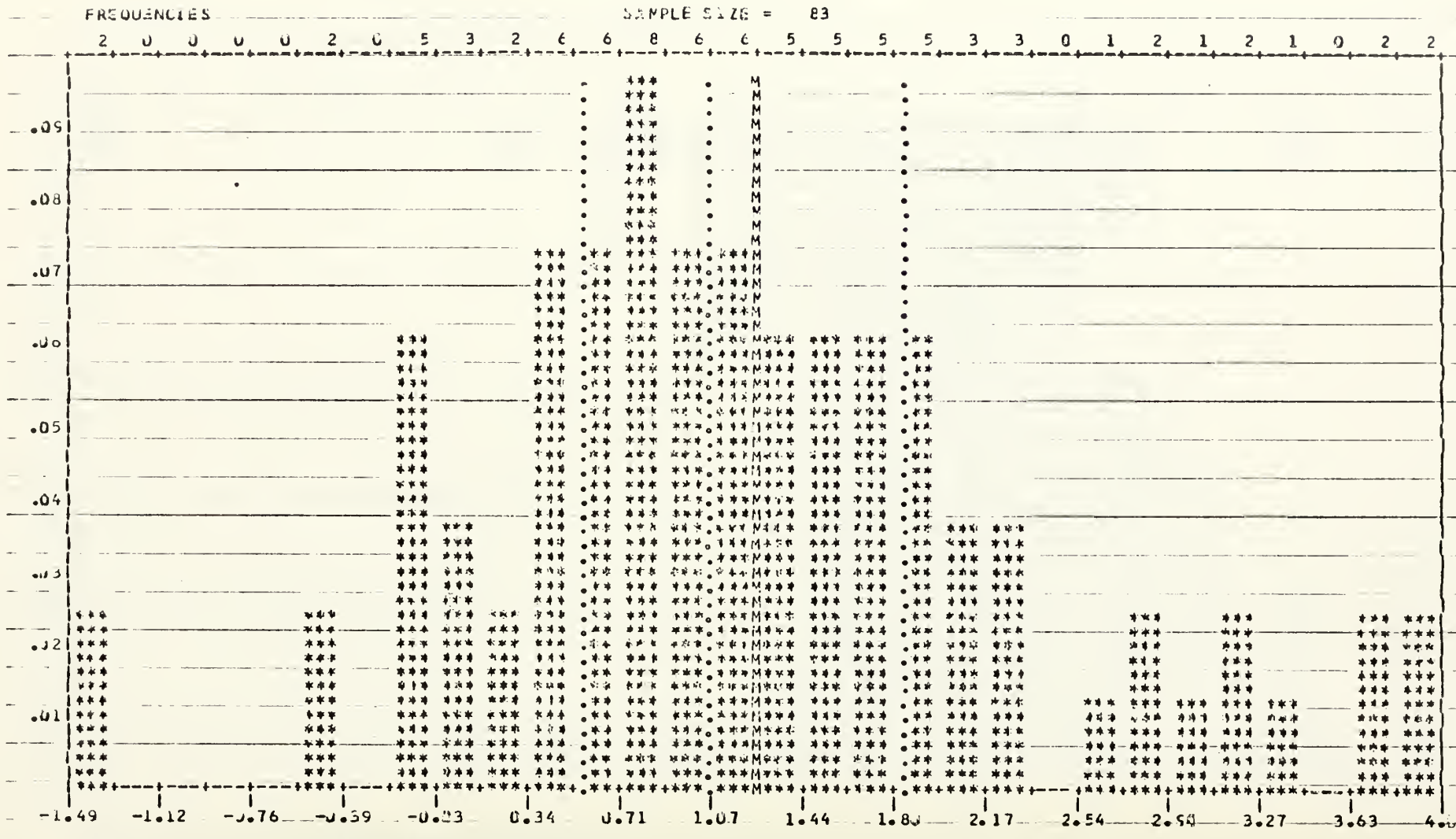
FREQUENCIES SAMPLE SIZE = 86



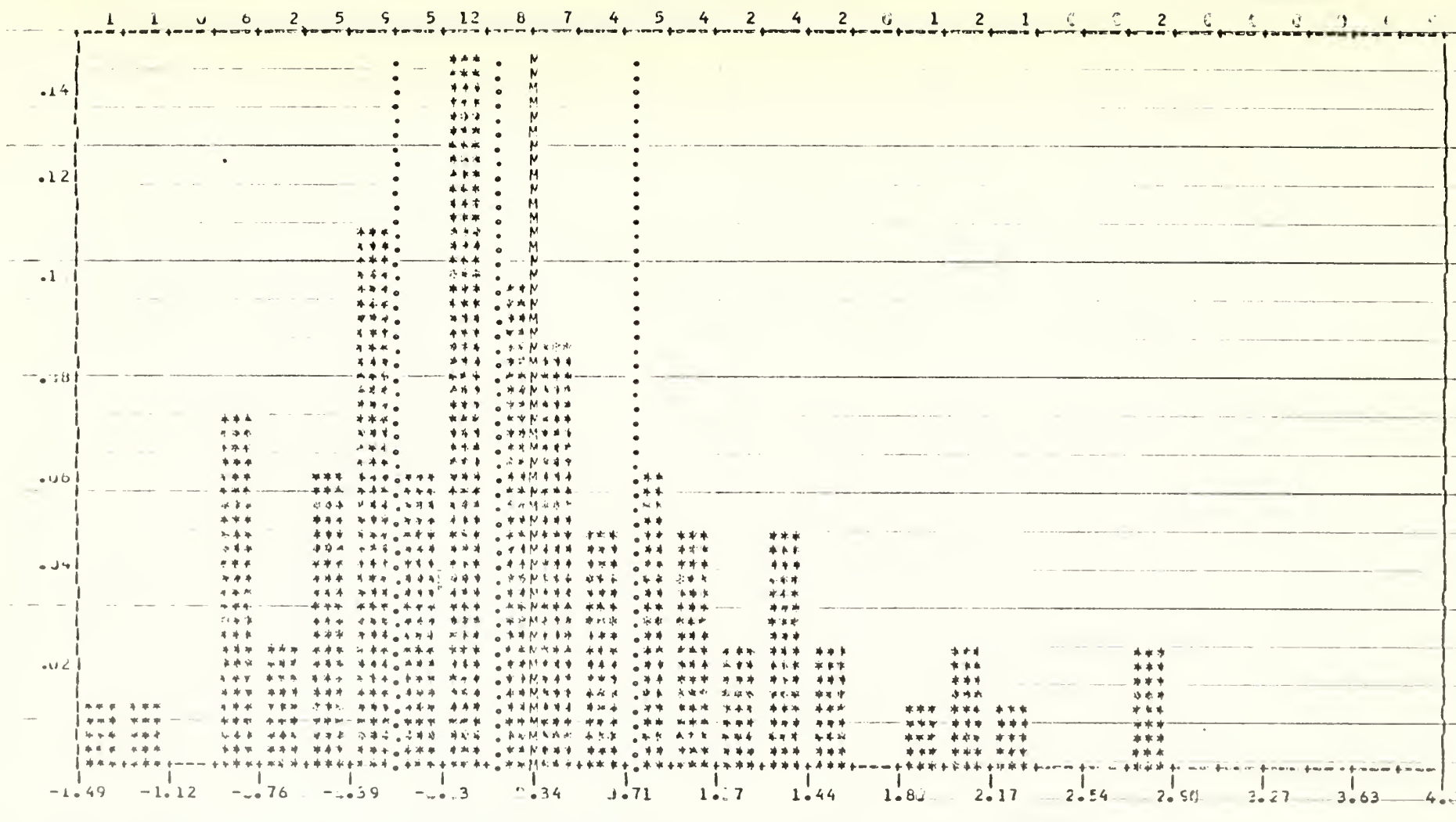
SCALE FIXED FROM -5.52 TO 3.74

CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-2.199118E-01	VARIANCE	1.062614E 00	M3	-1.776241E 00	MINIMUM	-5.522198E 00
MEDIAN	-1.318207E-01	STD DEV	1.030831E 00	M4	4.167219E 01	.10 QUANTILE	-1.393172E 00
TRIMEAN	-1.347172E-01	COEF VAR	4.688156E	SKEWNESS	-1.621584E 00	.25 QUANTILE (HINGE)	-6.813736E-01
MIDMEAN	-1.066458E-01	MEAN DEV	7.092487E-01	KURTOSIS	7.335377E 00	.50 QUANTILE (MEDIAN)	-1.318207E-01
MIDRANGE	-1.492711E 00	RANGE	8.589735E 00	BETA1	-1.714766E 00	.75 QUANTILE (HINGE)	4.761461E-01
		MIDSPREAD	1.087526E 00	BET/2	1.120488E 01	.90 QUANTILE	6.598196E-01
						MAXIMUM	2.536776E 00

Δ_1 Errors of FAST Model for Pay Grade E7

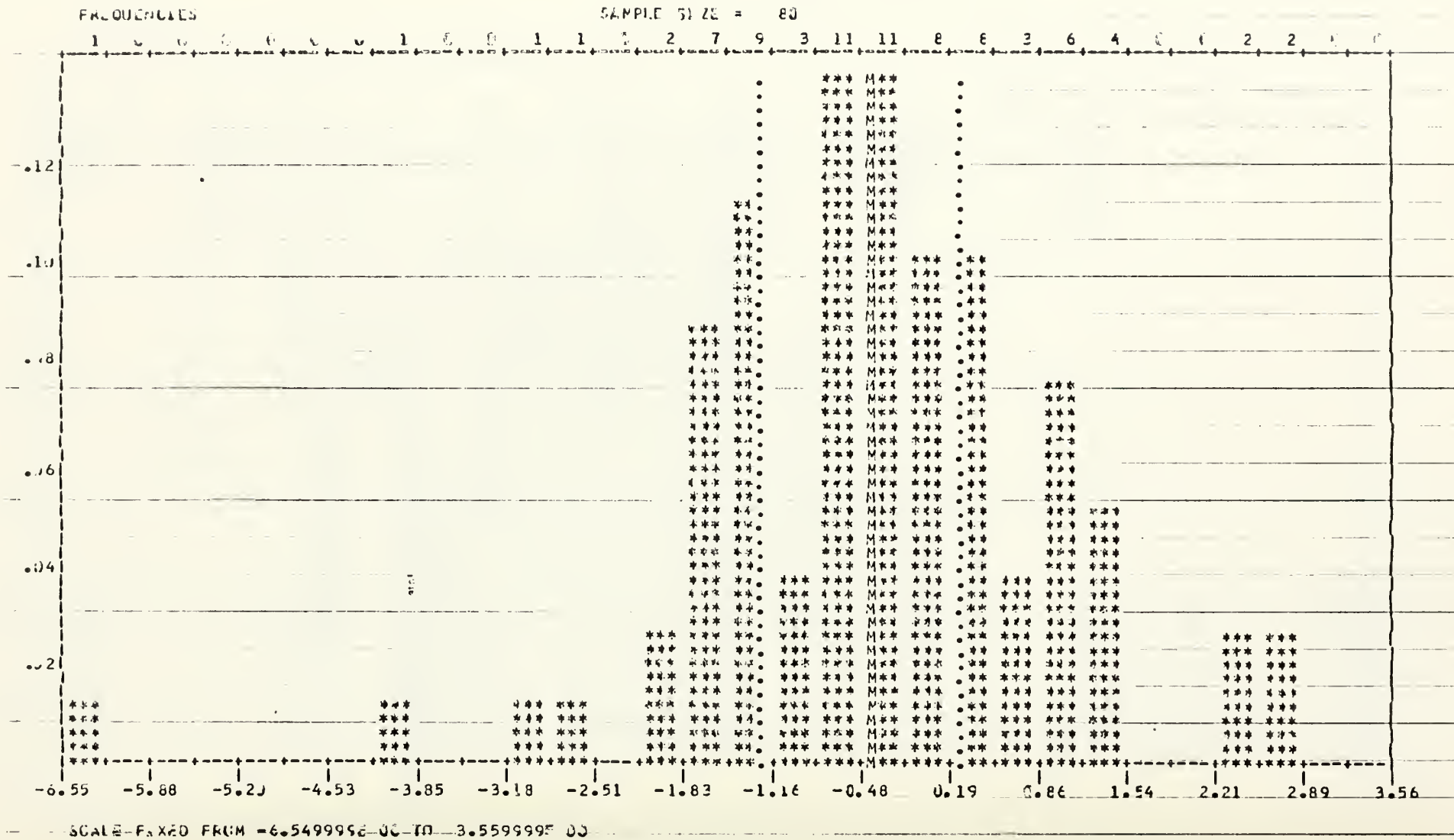


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.243359E 00	VARIANCE	1.233595 E 00	M3	5.394588E-01	MINIMUM	-1.492481E 00
MEDIAN	1.083793E 00	STD DEV	1.110671E 00	M4	5.116882E 00	.10 QUANTILE	-1.270459E-01
TRIMEAN	1.147299E 00	COEF VAR	8.932829E-01	SKEWNESS	3.937235E-01	.25 QUANTILE	-1.270459E-01



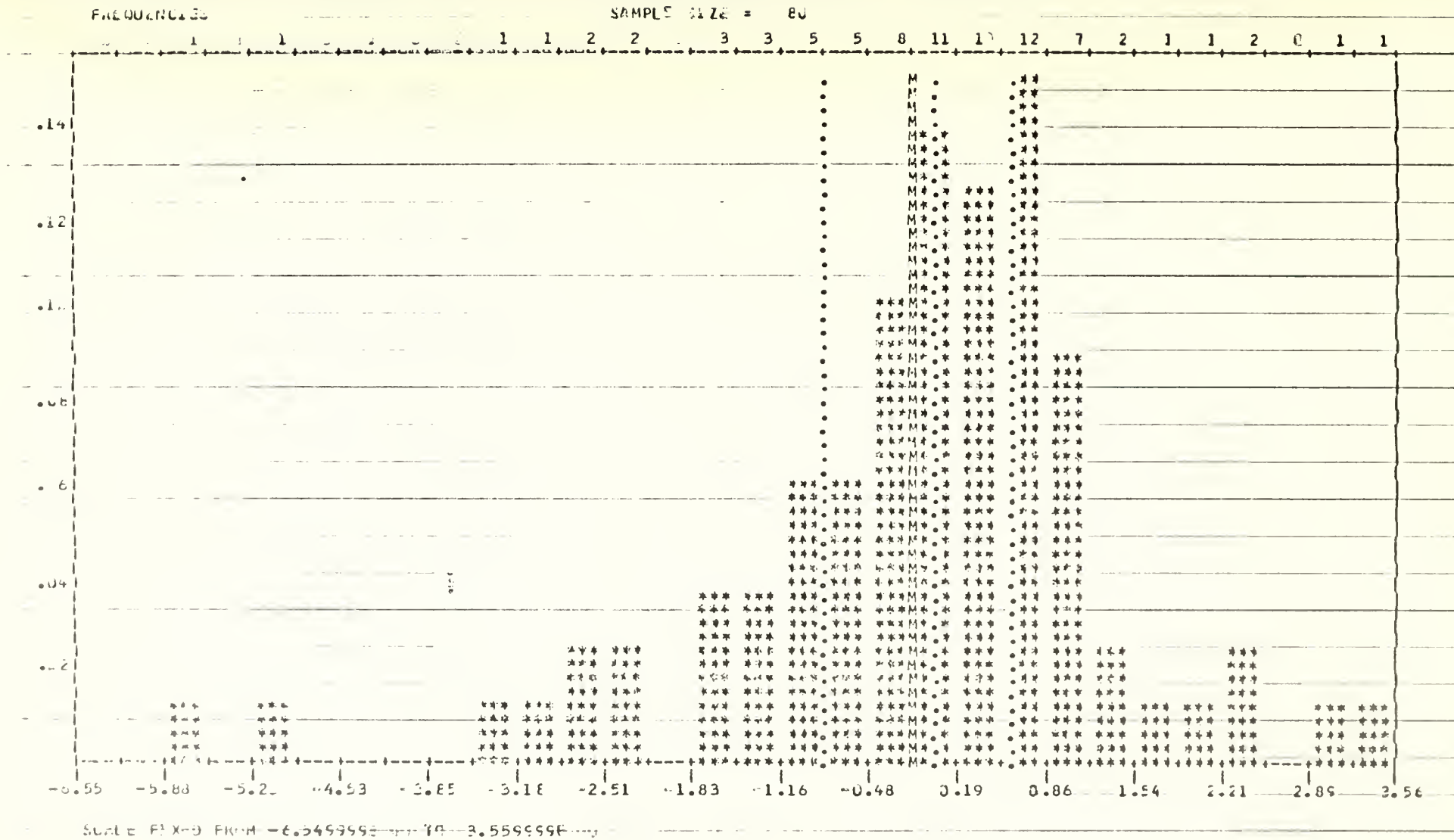
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	3.16724E- 1	VARIANCE	7.22442E- 1	M3	4.67372E-01	MINIMUM	-1.36475E 00
MEDIAN	1.72288E-01	STD DEV	8.49966E-01	M4	1.91278E 00	.10 QUANTILE	-7.88132E-01
TRIMEAN	2.16357E-01	COEF VAR	2.68366E 00	SKEWNESS	7.61129E-01	.25 QUANTILE (HINGE)	-2.26443E-01
MIDMEAN	2.09782E-01	MEAN DEV	6.34021E-01	KURTOSIS	6.64884E-01	.50 QUANTILE (MEDIAN)	1.72288E-01
MIDRANGE	7.12448E-02	RANGE	4.19448E 00	BETA1	4.56153E-01	.75 QUANTILE (HINGE)	7.47453E-01
		MIDSPREAD	9.73897E- 1	BETA2	1.85766E 00	.90 QUANTILE	1.29443E 00
						MAXIMUM	2.80968E 00

Δ_1 Errors of FAST Model for Pay Grade E8



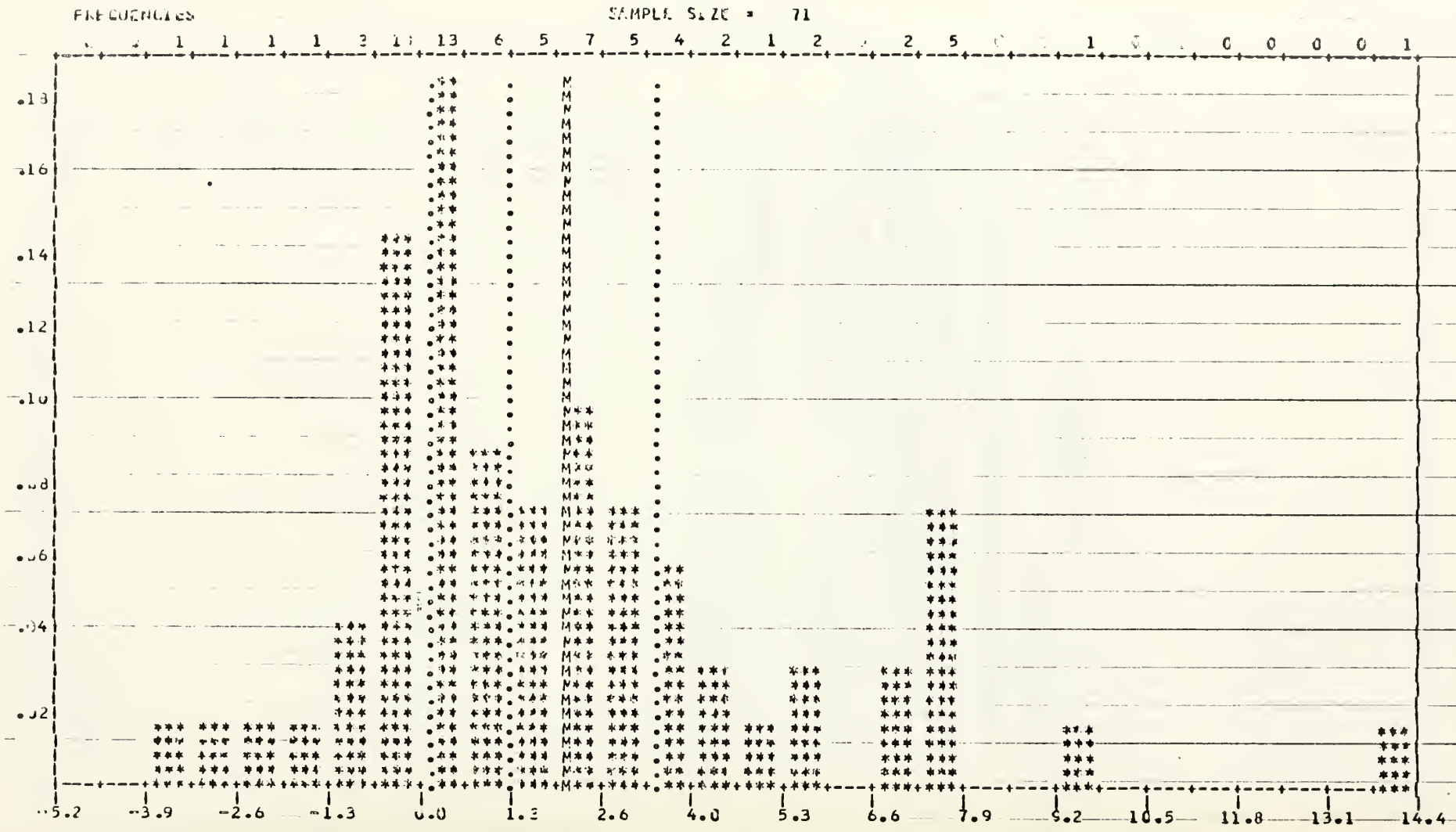
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-3.957163E-01	VARIANCE	2.0247 1E 00	M3	-2.621224E 00	MINIMUM	-6.5456E6E 00
MEDIAN	-3.887482E-01	STD DEV	1.422922E 00	M4	2.77E256E 01	.10 QUANTILE	-1.8[illegible]E 00
[illegible]	-4.22[illegible]E-01	COEF VAR	3.595954E 00	SKEWNESS	-9.[illegible]E-01	.25 QUANTILE (HINGE)	-1.2[illegible]E 00

Δ_1 Errors of Advancement Model for Pay Grade E8

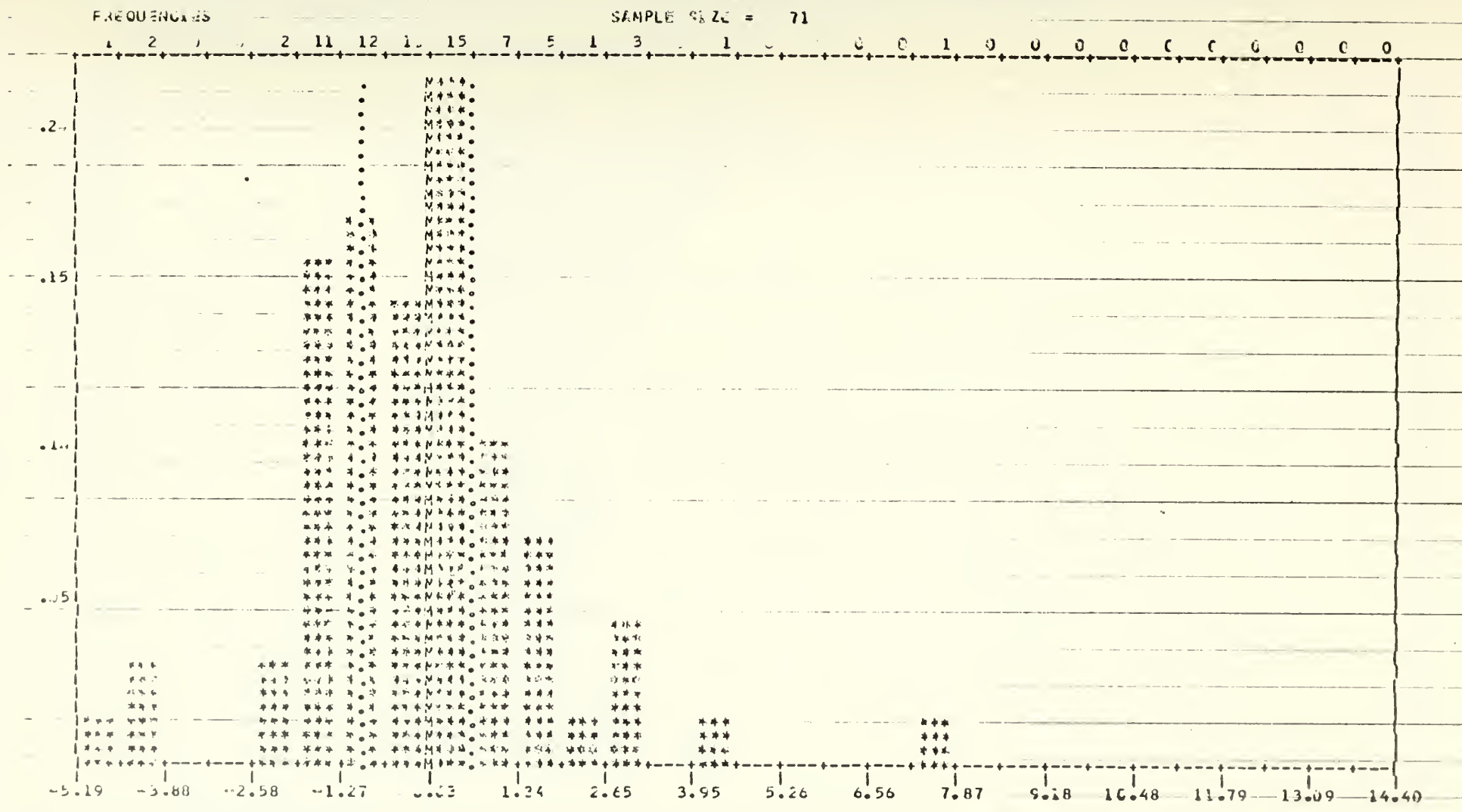


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-1.134638E-01	VARIANCE	2.246933E 00	M3	-3.397743E 00	MINIMUM	-5.715848E 00
MEDIAN	1.361465E-02	STD DEV	1.496894E 00	M4	2.896831E 01	.10 QUANTILE	-2.297435E 00
TRIMEAN	-1.448031E-02	COEF VAR	1.264161E 01	SKEWNESS	-1.013019E 00	.25 QUANTILE (HINGE)	-7.721434E-01
MIDMEAN	7.621697E-02	MEAN D=V	1.232652E 00	KURTOSIS	2.769768E 00	.5 QUANTILE (MEDIAN)	1.361465E-02
MIDRANGE	-1.776458E 00	RANGE	9.278779E 00	BETA1	-3.271396E 00	.75 QUANTILE (HINGE)	6.865688E-01
		M.DSPREAD	1.459112E 00	BETA2	2.788962E 01	.90 QUANTILE	1.186966E 00
						MAXIMUM	3.562931E 00

Δ_1 Errors of FAST Model for Pay Grade E9

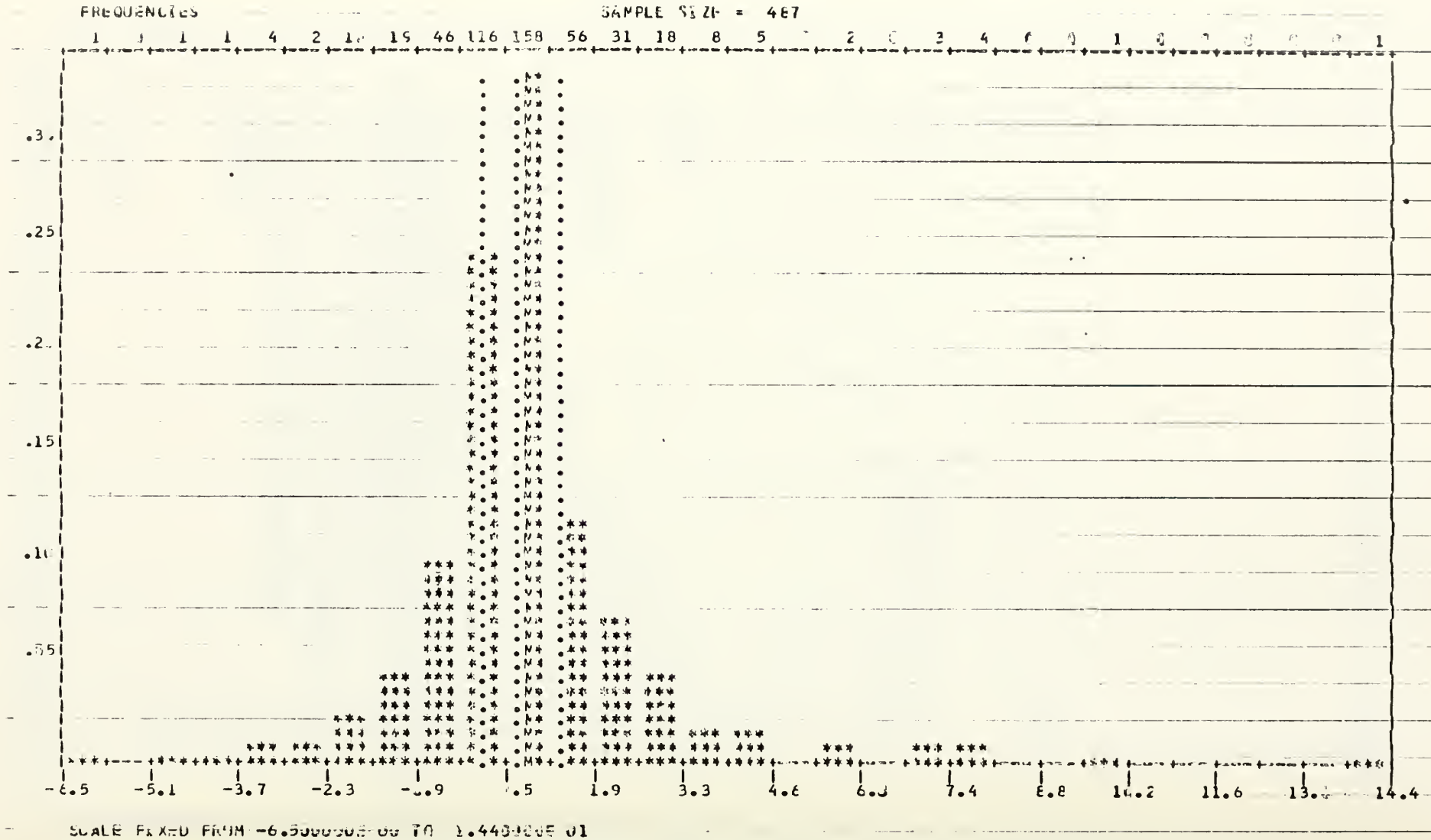


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.098679E 00	VARIANCE	9.712337E 00	M3	4.052135E 01	MINIMUM	-3.284119E 01
MEDIAN	1.287661E 00	STD DEV	3.114856E 00	M4	5.961945E 02	.1 QUANTILE	-6.946665E 01

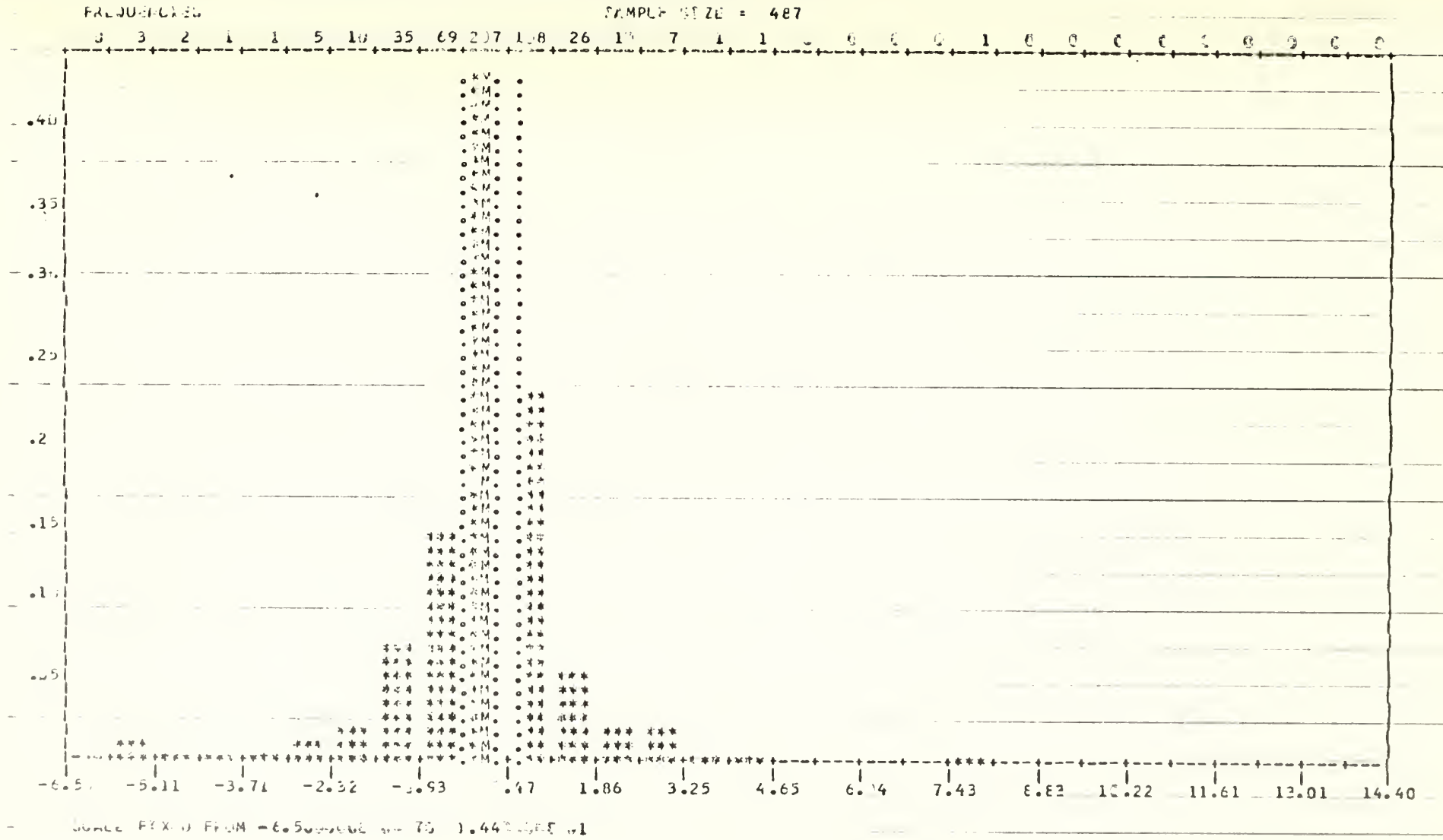


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-8.967478E-02	VARIANCE	3.433529E 00	M3	5.372515E 00	MINIMUM	-5.191879E 00
MEDIAN	-5.163574E-02	STD DEV	1.852997E 00	M4	8.698236E 01	.10 QUANTILE	-1.762146E 00
TRIMEAN	-1.285156E-01	COEF VAR	2.066444E 01	SKEWNESS	8.444107E-01	.25 QUANTILE (HINGE)	-1.107773E 00
MIDMEAN	-1.796875E-01	MEAN DEV	1.281143E 00	KURTOSIS	4.377086E 00	.50 QUANTILE (MEDIAN)	-5.163574E-02
MIDRANGE	1.287823E 00	RANGE	1.295454E 01	BETA1	5.147642E 00	.75 QUANTILE (HINGE)	8.577644E-01
		MIDSPREAD	1.815557E 00	BETA2	8.365832E 01	.90 QUANTILE	1.731564E 00
						MAXIMUM	7.753525E 00

Δ_1 Errors of FAST Model for All Pay Grades



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	7.786875E-01	VARIANCE	2.862315E 01	M3	9.567180E 00	MINIMUM	-6.545656E 00
MEDIAN	-6.140641E-01	STD DEV	1.691828E 00	M4	1.311775E 02	.10 QUANTILE	-7.277945E-01
TRIMEAN	6.33147[illegible]E-01	COEF VAR	2.172679E 00	SKEWNESS	1.975628E 00	.25 QUANTILE	[illegible]



CENTRAL TENDENCY

MEAN	1.145165E-01
MEDIAN	2.383947E-01
TRIMEAN	1.991563E-01
MIDMEAN	2.047769E-01
MIDRANGE	1.718838E 01

SPREAD

VARIANCE	1.292884E 00
STD DEV	1.137 5.E-01
COEF VAR	9.929139E 00
MEAN DEV	7.386111E-01
RANGE	1.346937E 01
MIDSPREAD	8.446902E-01

HIGHER CENTRAL MOMENTS

M3	-5.984865E-01
M4	2.[illegible]E 01
SKEWNESS	-4.071143E-01
KURTOSIS	9.068574E 00
BETA1	-5.948351E-01
BETA2	1.992857E 01

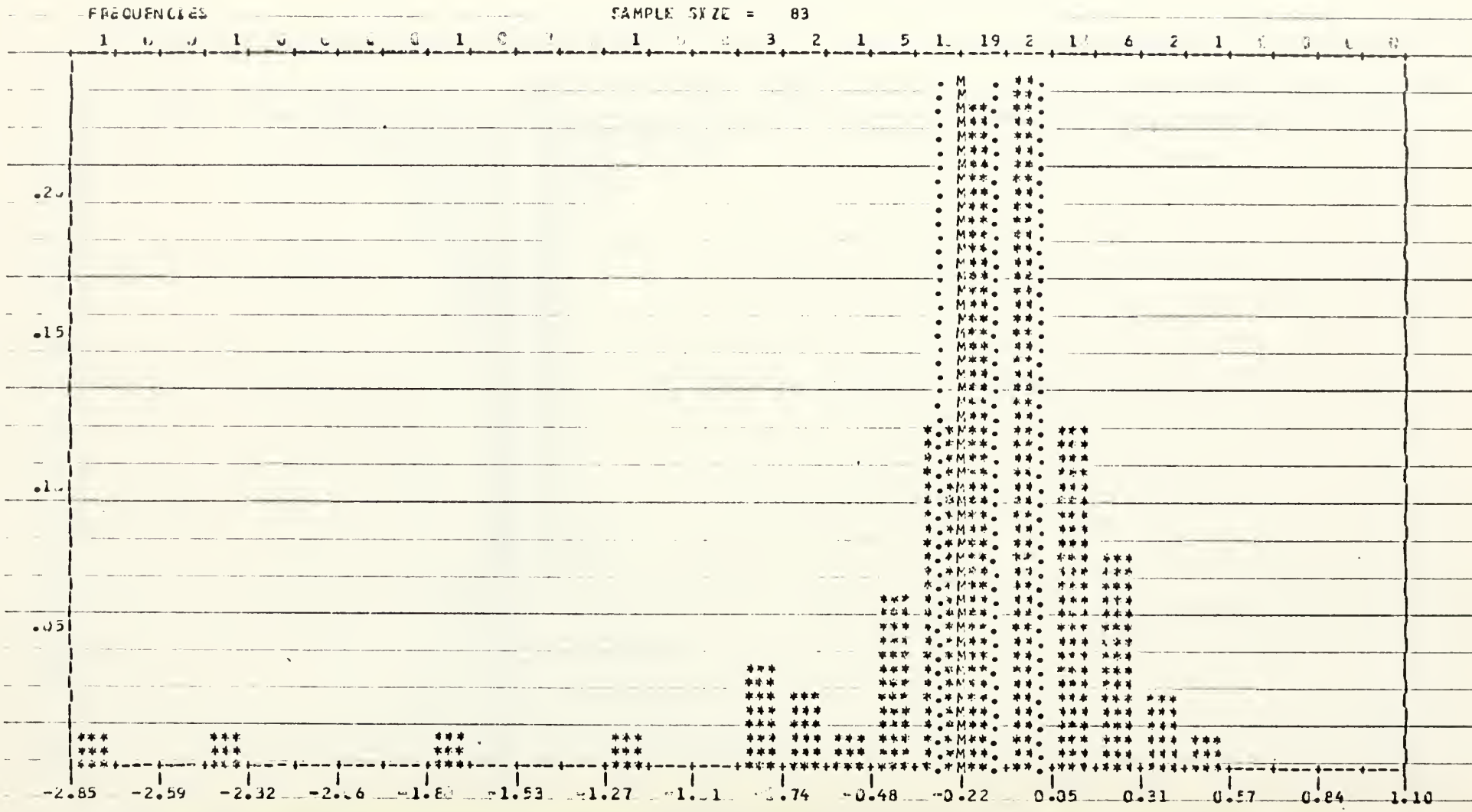
DISTRIBUTION

MINIMUM		-5.715848E 00
.1 QUANTILE		-1.1[illegible]E-01
.25 QUANTILE	(HINGE)	-2.624388E-01
.50 QUANTILE	(MEDIAN)	2.383947E-01
.75 QUANTILE	(HINGE)	1.822155E-01
.90 QUANTILE		1.[illegible]E 00
MAXIMUM		7.753525E 00

APPENDIX E

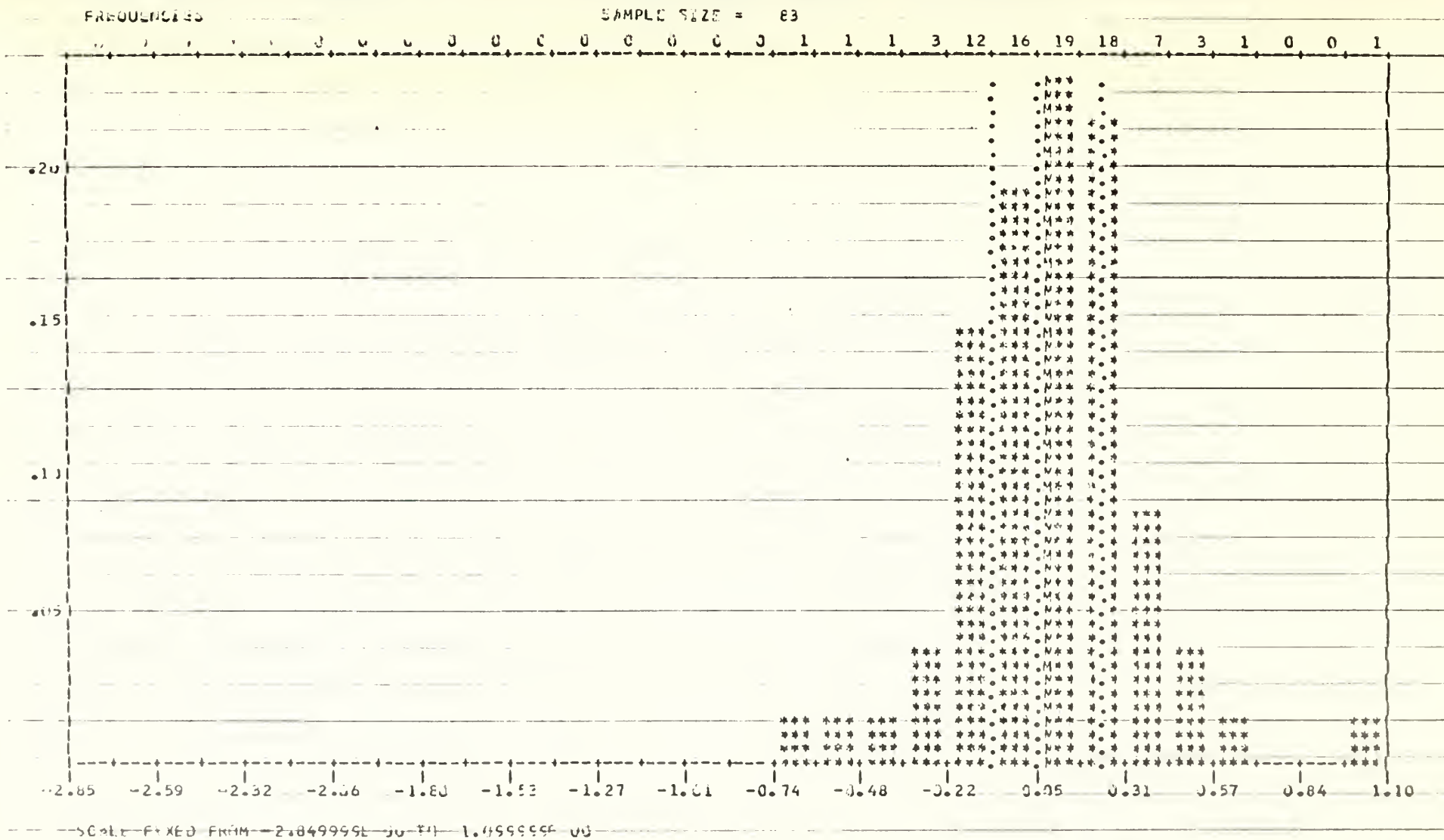
HISTOGRAMS OF Δ_2 ERRORS, ALL RATINGS, FAST MODEL AND ADVANCEMENT MODEL

Δ_2 Errors of the FAST Model for Pay Grade E4



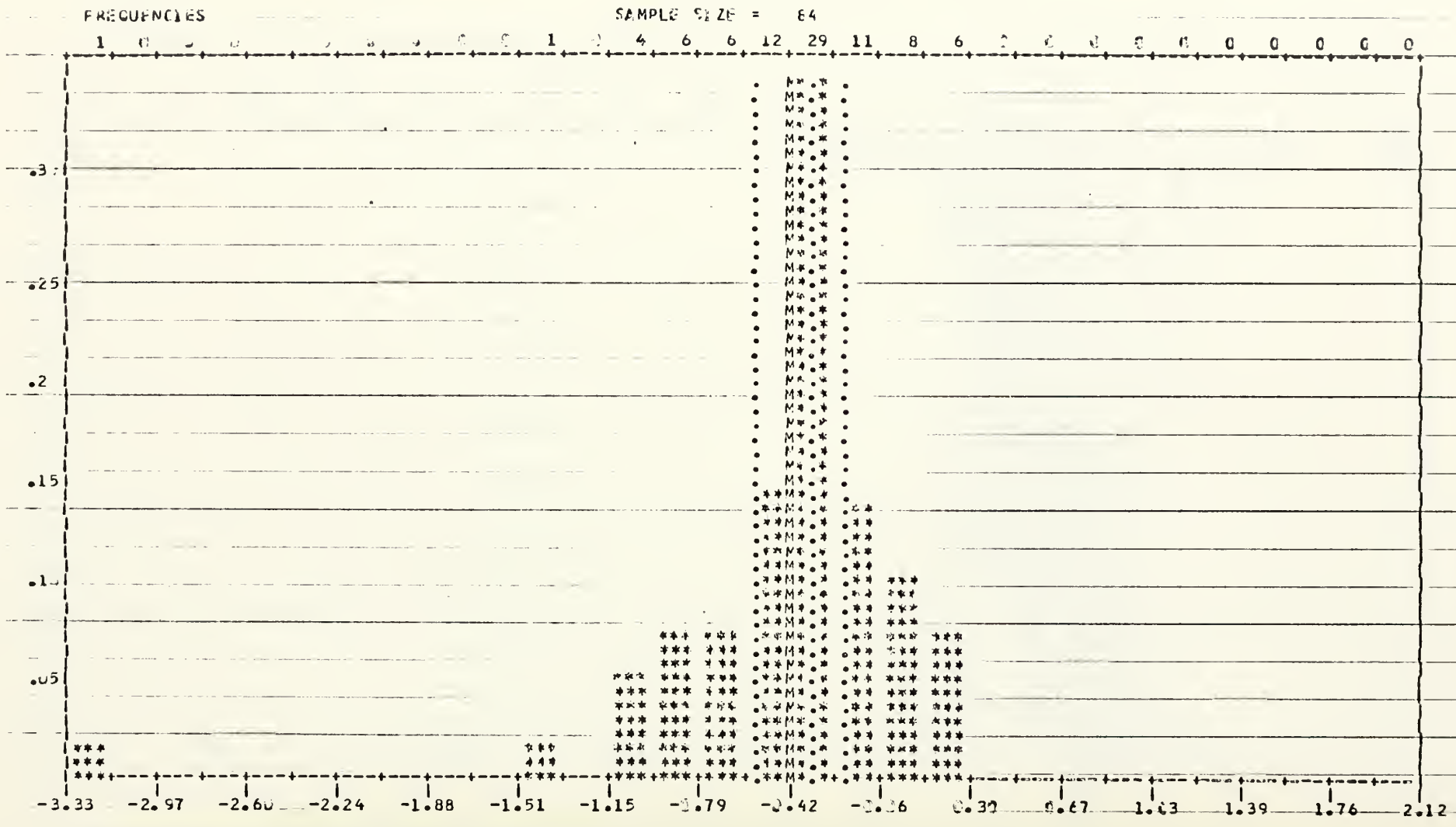
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-2.033699E-01	VARIANCE	2.576791E-01	M3	-4.185760E-01	MINIMUM	-2.845658E 00
MEDIAN	-1.074-2dE-01	STD DEV	5.-7621-E-01	M4	1.-2882-E-01	.1 QUANTILE	-6.-2667-E-01
TRIMEAN	-1.117668E-01	COEF VAR	2.496146E 00	SKEWNESS	-3.200042E 00	.25 QUANTILE (FIRST)	-2.464247E-01

Δ_2 Errors of the Advancement Model for Pay Grade E4

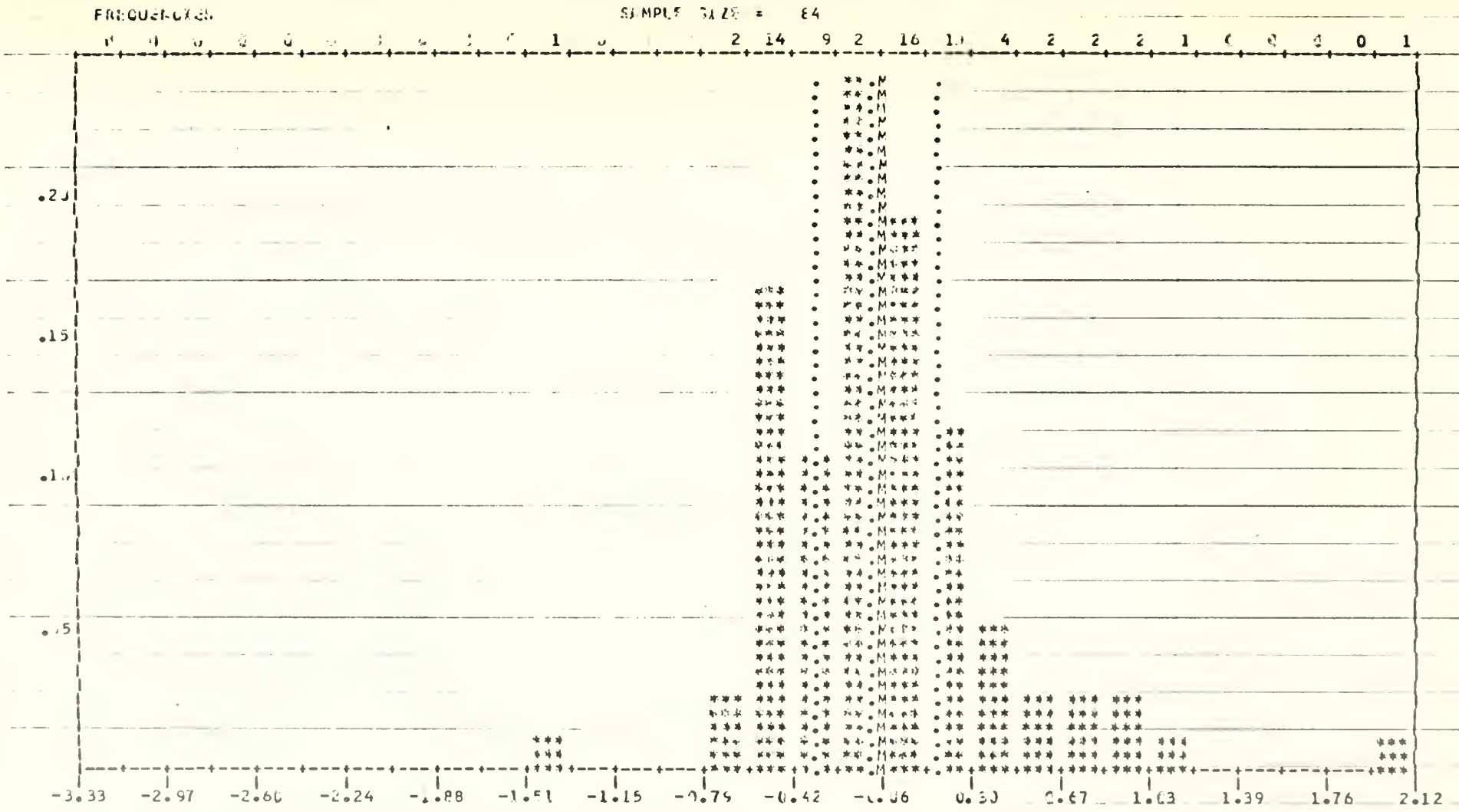


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	9.315434E-02	VARIANCE	6.473416E-02	M3	5.627118E-03	MINIMUM	-6.644376E-01
MEDIAN	6.713156E-02	STD DEV	2.544295E-01	M4	2.392331E-02	.10 QUANTILE	-1.961502E-01
TRIMEAN	7.624696E-02	COEF VAR	2.731321E 00	SKEWNESS	3.416528E-01	.25 QUANTILE (HINGE)	-7.877652E-02
MIDMEAN	8.886459E-02	MEAN DEV	1.871938E-01	KURTOSIS	2.718855E 00	.5 QUANTILE (MEDIAN)	6.713156E-02
MIDRANGE	2.186476E-01	RANGE	1.766570E 00	BETA1	5.425360E-03	.75 QUANTILE (HINGE)	2.493222E-01
		MEDSPREAD	3.280287E-01	BETA2	2.367713E-02	.90 QUANTILE	3.652223E-01
						MAXIMUM	1.102133E 00

Δ_2 Errors of FAST Model for Pay Grade E5



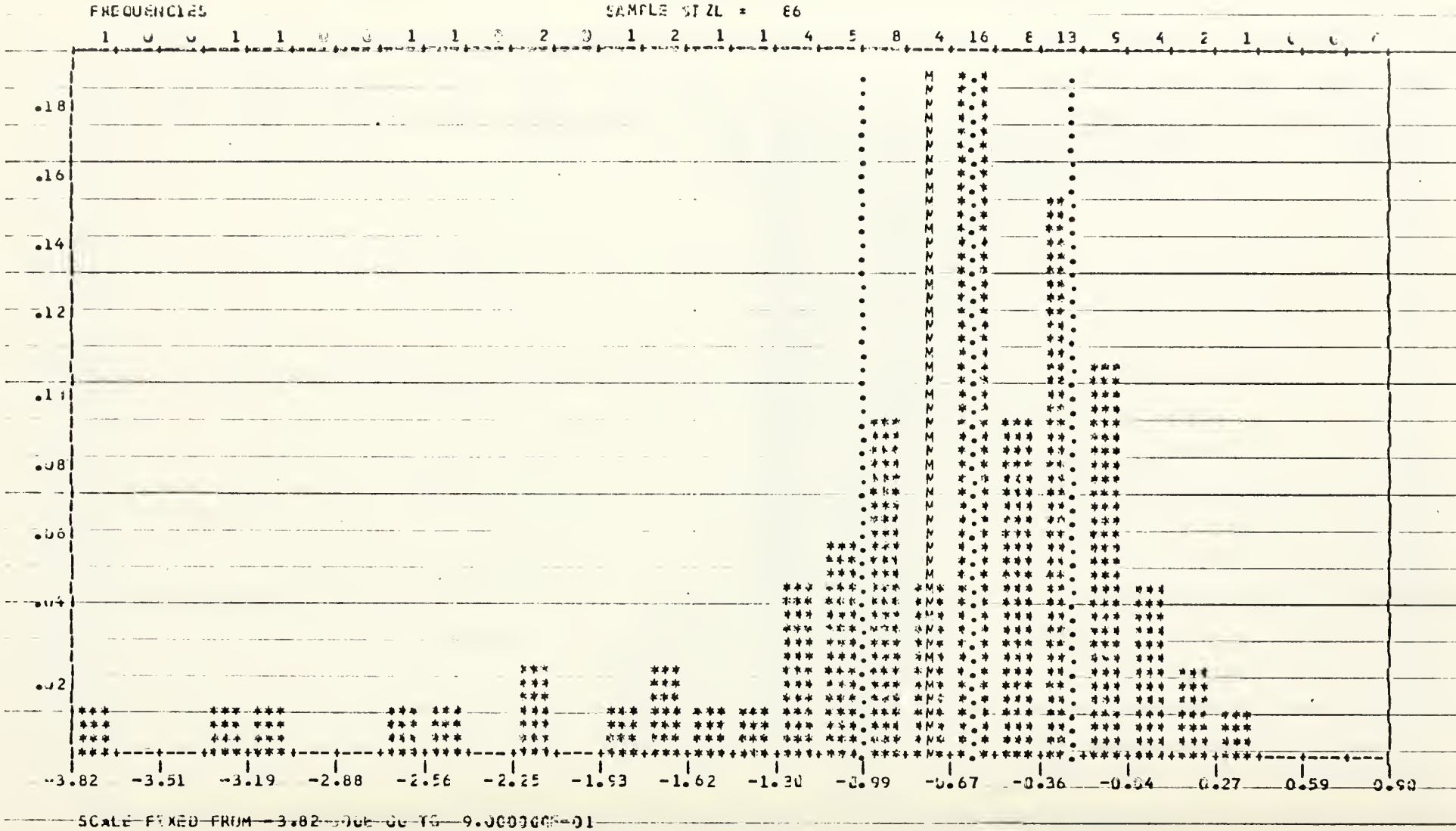
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-4.1 3.67E-01	VARIANCE	2.134551E-1	M3	-3.1 8895E-01	MINIMUM	-3.326635E 00
MEDIAN	-3.471680E-01	STD DEV	4.622553E-01	M4	6.464529E-01	.10 QUANTILE	-8.082866E-01
TRIMEAN	-3.532665E-01	COEF VAR	1.126122E 00	SKEWNESS	-3.15155E 0	.25 QUANTILE (HINGE)	-5.25 2225E-01



SCALE FIXED FROM -3.33000E 00 TO 2.12000E 00

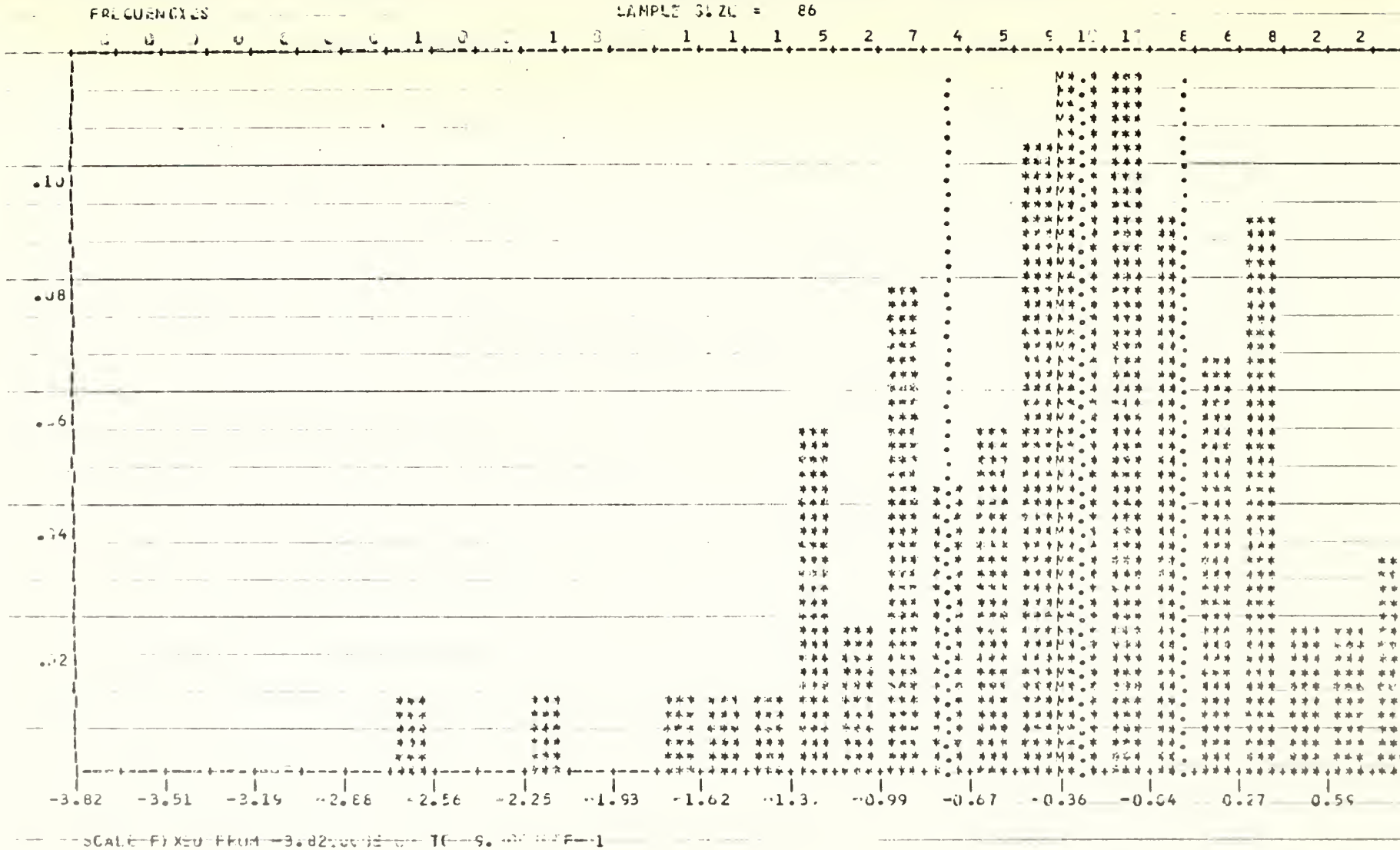
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-4.38215E-02	VARIANCE	2.173365E-01	M3	1.452919E-01	MINIMUM	-1.33723E 00
MEDIAN	-8.38470E-02	STD DEV	4.661936E-01	M4	3.966669E-01	.10 QUANTILE	-4.922534E-01
TRIMEAN	-8.26619E-02	COEF VAR	1.063 9E 01	SKEWNESS	1.433579E 00	.25 QUANTILE (HINGE)	-3.217244E-01
MIDMEAN	-8.98293E-02	MEAN DEV	3.186 2E-01	KURTOSIS	5.270471E 00	.50 QUANTILE (MEDIAN)	-8.38470E-02
MIDRANGE	3.89866E-01	RANGE	3.45418E 00	BETA1	1.411442E-01	.75 QUANTILE (HINGE)	1.587726E-01
		MADSPREAD	4.83495E-01	BETA2	3.753711E-01	.90 QUANTILE	3.257261E-01
						MAXIMUM	2.116950E 00

Δ_2 Errors of FAST Model for Pay Grade E6



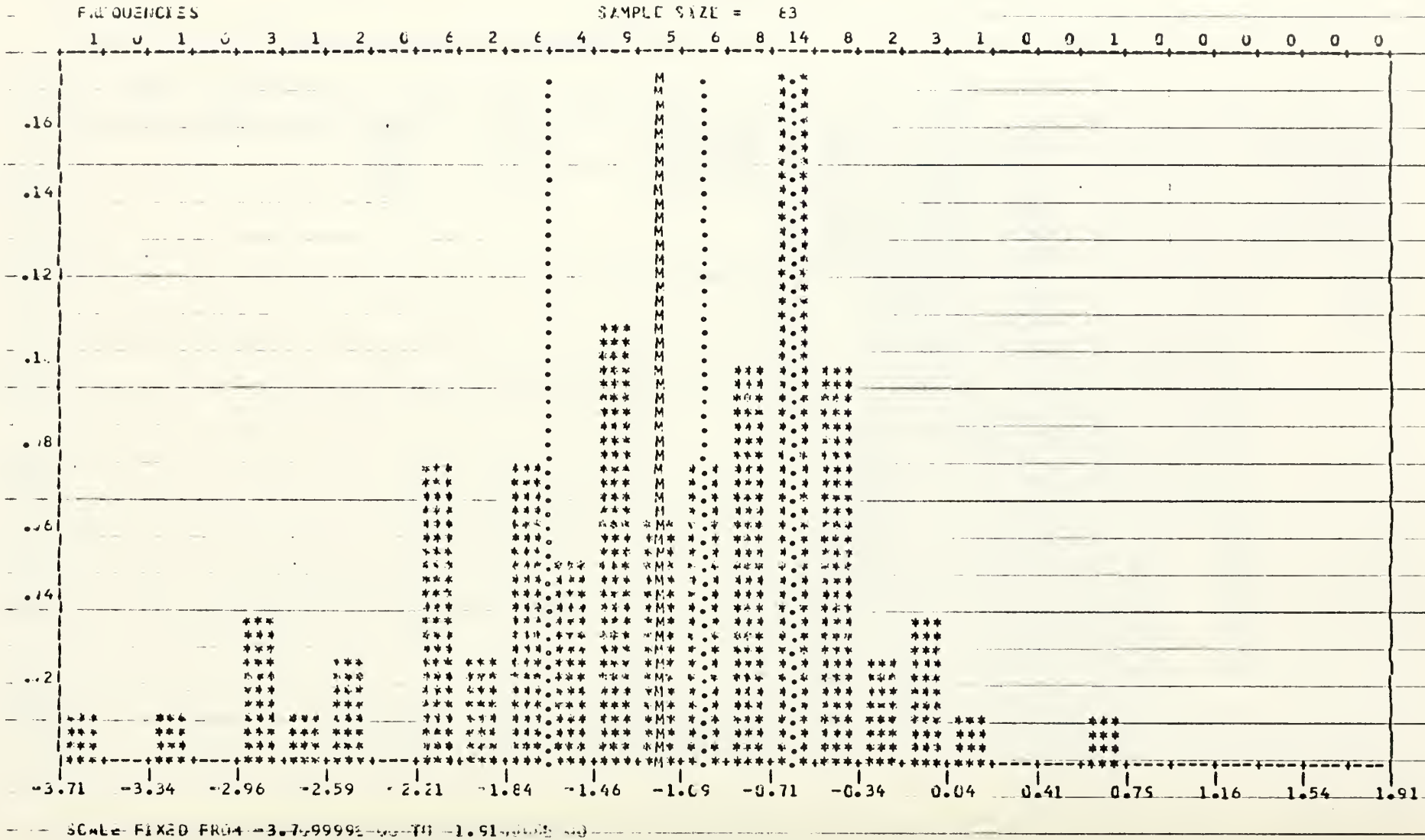
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-7.567476E-01	VARIANCE	5.964389E-01	M3	-8.442845E-01	MINIMUM	-3.821365E 00
MEDIAN	-5.787725E-1	STD DEV	7.722546E -1	M4	2.405562E 00	.10 QUANTILE	-1.166666E 00
TAYMEAN	-5.943404E-1	COEF VAR	1.020544E 00	SKEWNESS	-1.832643E 00	.25 QUANTILE (HINGE)	-9.816686E-01
MIDMEAN	-5.873352E-1	MEAN DEV	5.128671E-1	KURTOSIS	3.768198E		

Δ_2 Errors of Advancement Model for Pay Grade E6

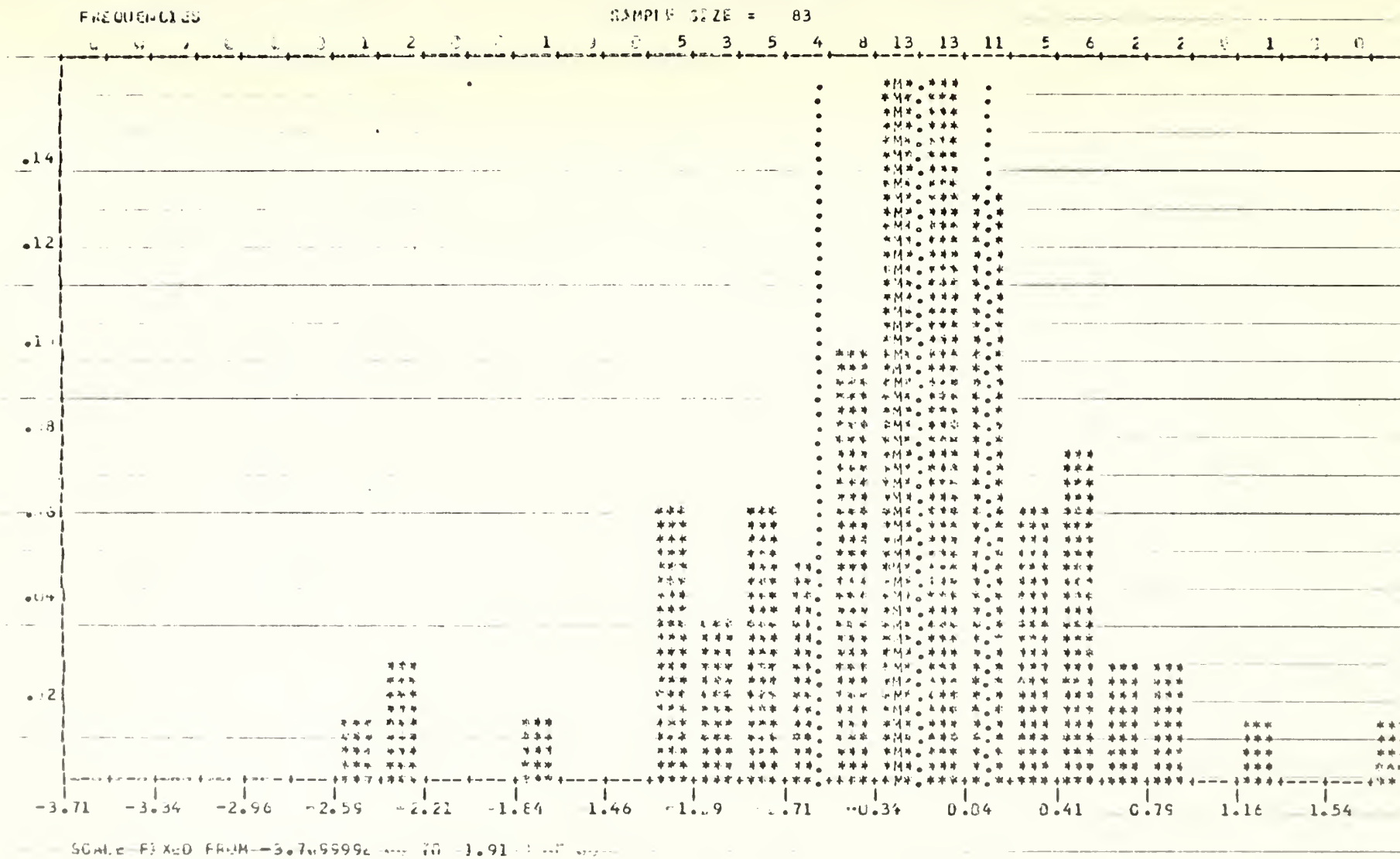


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-3.251372E-01	VARIANCE	4.215533E-01	M3	-2.104384E-01	MINIMUM	-2.655513E 00
MEDIAN	-2.533784E-01	STD DEV	6.492691E-01	M4	7.552665E-01	.10 QUANTILE	-1.155413E 00
TRIMEAN	-2.885915E-01	COEF VAR	1.996907E 00	SKEWNESS	-7.686665E-01	.25 QUANTILE (HINGE)	-7.284152E-01
MIDMEAN	-2.697375E-01	MEAN DEV	4.899502E-01	KURTOSIS	1.223449E 00	.50 QUANTILE (MEDIAN)	-2.533784E-01
MIDRANGE	-8.739367E-01	RANGE	3.553152E 00	BETA1	2.331544E-01	.75 QUANTILE (HINGE)	9.175602E-02
		MIDSPREAD	8.301629E-01	BETA2	7.276029E-01	.90 QUANTILE	3.954105E-01
						MAXIMUM	5.226294E-01

Δ_2 Errors of FAST Model for Pay Grade E7



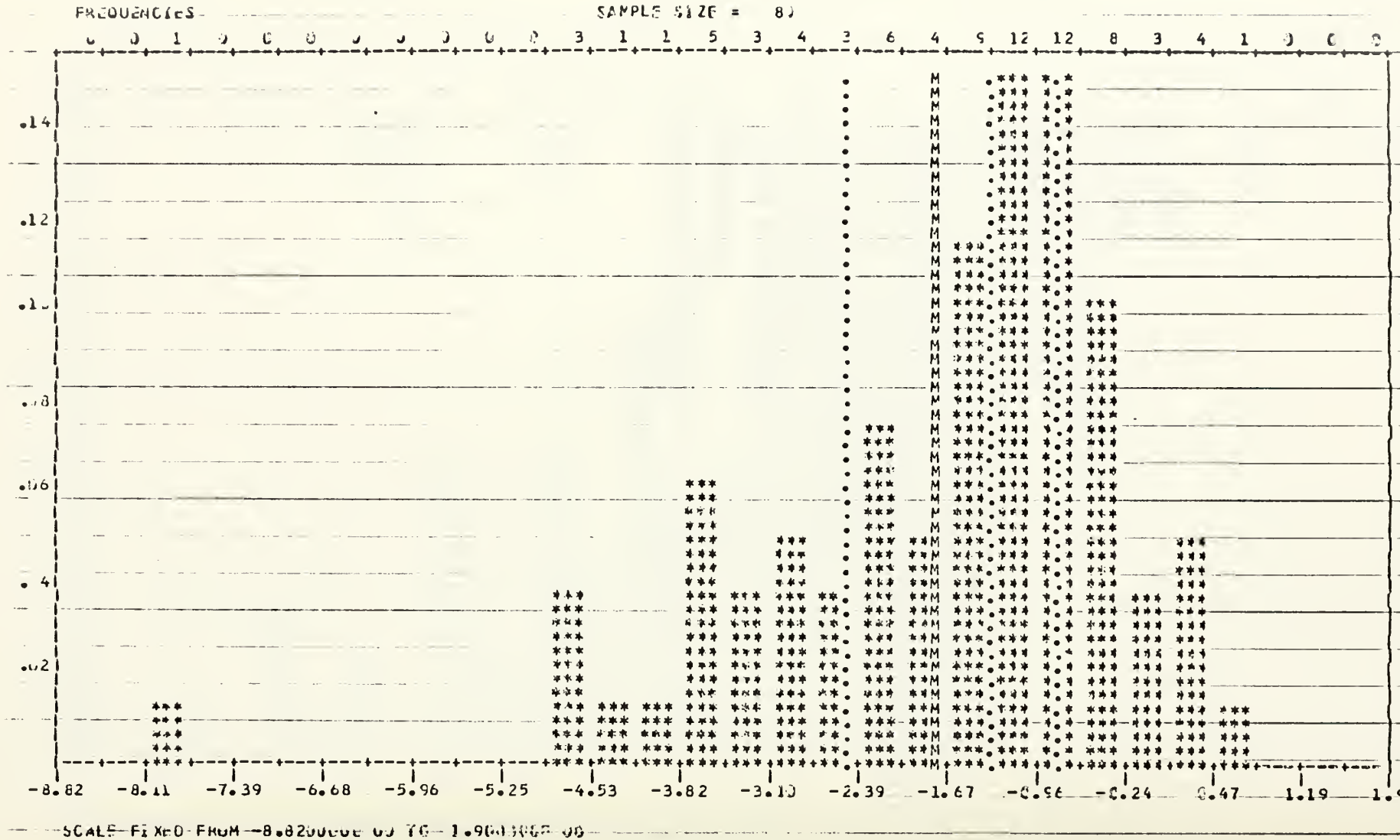
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-1.194921E 00	VARIANCE	6.5983 5E-1	M3	-3.78 6.3E-01	MINIMUM	-3.71 5475 00
MEDIAN	-1.[illegible]85943E 00	STD DEV	8.122955E-1	M4	1.5 6322E 00	.1 QUANTILE	-2.425632E 00
TRIMEAN	-1.076561E 00	COEF VAR	6.797932E-01	SKEWNESS	-7.053627E-01	.25 QUANTILE (HINGE)	-1.683944E 00
MIDMEAN	-1.[illegible]7736E 00	MEAN DEV	6.358137E-1	KURTOSIS	4.568169E-1	[illegible] QUANTILE	[illegible]
MIDRANGE	[illegible]						



SCALE FIXED FROM -3.99999 TO 1.91

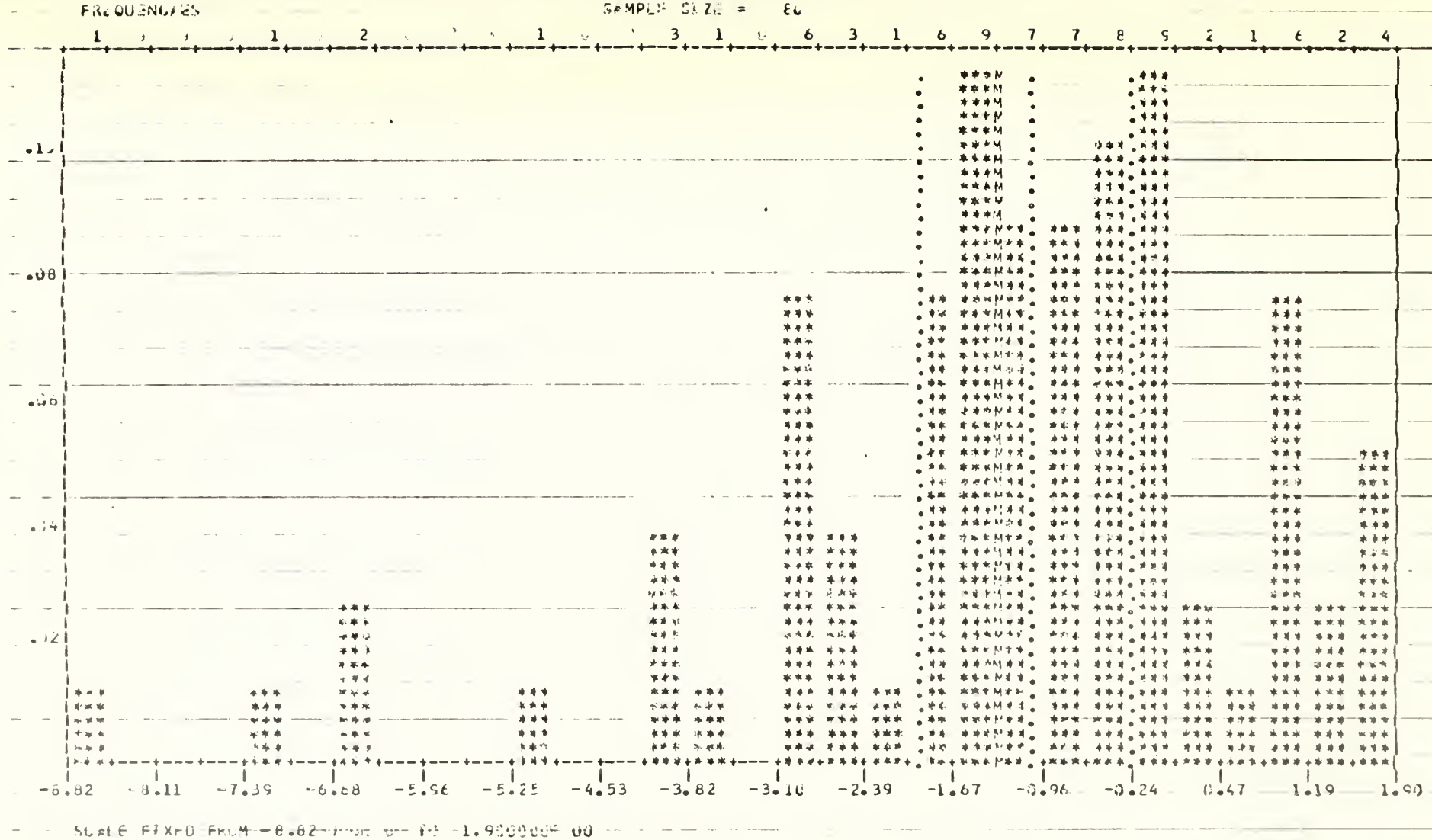
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-2.272525E-01	VARIANCE	5.221961E-01	M3	-2.525576E-01	MINIMUM	-2.526947E-01
MEDIAN	-1.523666E-01	STD DEV	7.226313E-01	M4	1.392481E 00	.1 QUANTILE	-1.163631E 00
TRIMEAN	-1.757581E-01	COEF VAR	3.179860E 00	SKEWNESS	-6.730995E-01	.25 QUANTILE (HINGE)	-5.645924E-01
MIDMEAN	-1.485734E-01	MEAN DEV	5.480726E-01	KURTOSIS	2.106485E 00	.5 QUANTILE (MEDIAN)	-1.523666E-01
MIDRANGE	-3.078139E-01	RANGE	4.437888E 00	BETA1	-2.448917E-01	.75 QUANTILE (HINGE)	1.662931E-01
		MIDSPREAD	7.398855E-01	BETA2	1.344740E 00	.90 QUANTILE	5.032336E-01
						MAXIMUM	1.911515E 00

Δ_2 Errors of FAST Model for Pay Grade E8



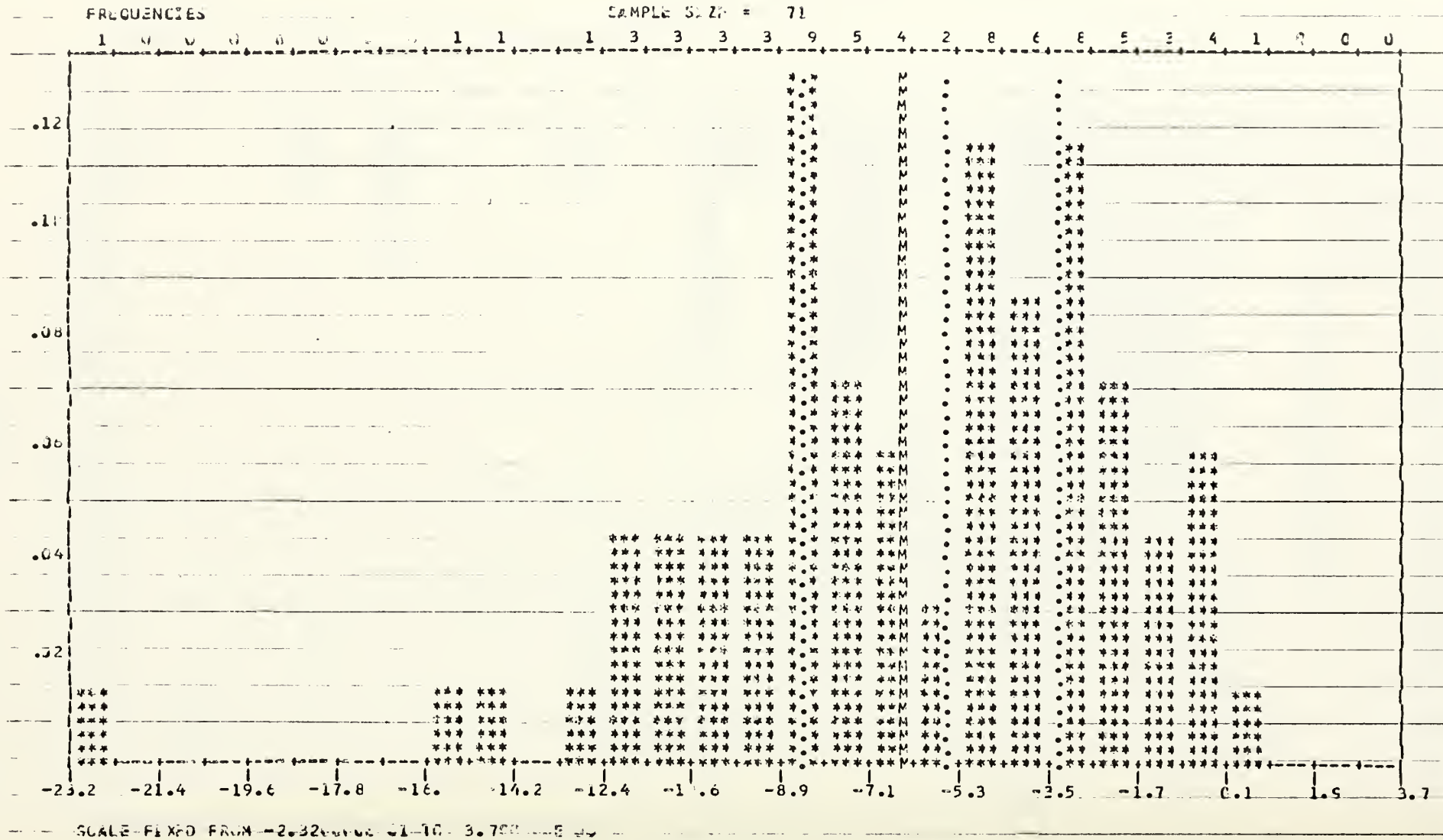
SCALE FIXED FROM -8.82000E 00 TO 1.90[illegible]E 00

CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-1.695995E 00	VARIANCE	2.1311155 00	M3	-4.1102695 00	MINIMUM	-7.7685215 00
MEDIAN	-1.326941E 00	STD DEV	1.4598345 00	M4	2.5[illegible]E 01	.10 QUANTILE	-3.6355145 00
TRIMEAN	-1.455885E 00	COEF VAR	8.6177125-01	SKEWNESS	-1.3211745 00	.25 QUANTILE (HINGE)	-2.4215625 00
MIDMEAN	-1.387975E 00	MEAN DEV	1.[illegible] 00	KURTOSIS	3.[illegible] 00		



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-1.265735E 00	VARIANCE	4.978615E 00	M3	-1.381237E 01	MINIMUM	-8.817513E 00
MEDIAN	-9.929981E-01	STD DEV	2.231315E 00	M4	9.193110E 01	.10 QUANTILE	-3.502102E 00
TR MEAN	-1.001245E 00	COEF VAR	1.763232E 00	SKEWNESS	-1.243423E 00	.25 QUANTILE (HINGE)	-1.874441E 00
MIDMEAN	-9.846353E-01	MEAN DEV	1.434515E 00	KURTOSIS	2.474546E 00	.5 QUANTILE (MEDIAN)	-9.929981E-01
MIDRANGE	-3.457982E 00	RANGE	1.071996E 01	BETA1	-1.041029E 01	.75 QUANTILE (HINGE)	-1.445408E-01
		MEDFMED	1.729915E 00	BETA2	8.857111E 01	.9 QUANTILE	9.737234E-01
						MAXIMUM	1.901546E 00

Δ_2 Errors of FAST Model for Pay Grade E9

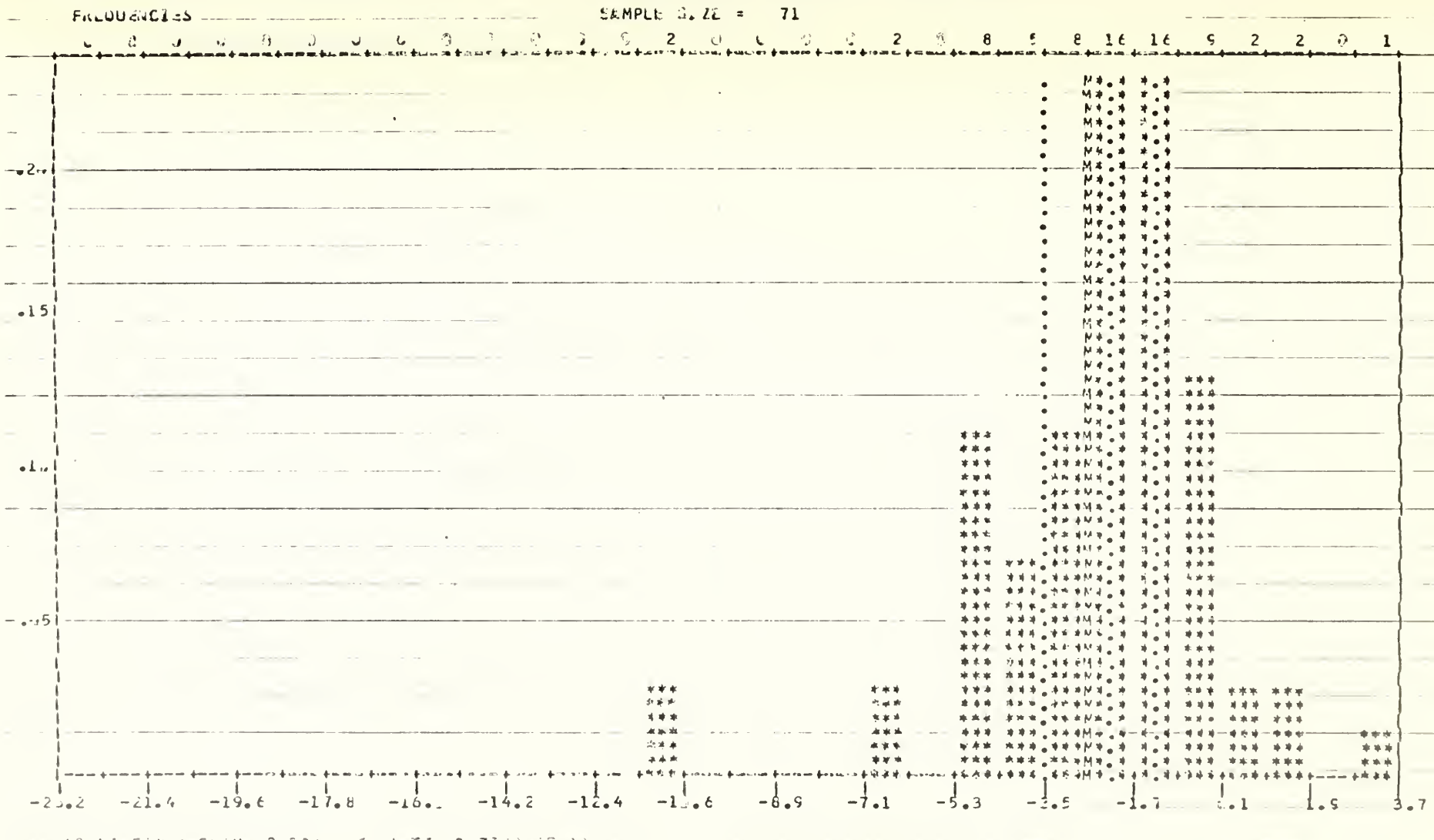


SCALE FIXED FROM -2.32 E1 TO 3.7 E0

CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-6.248933E 00	VARIANCE	1.8342835 01	M3	-8.2532315 01	MINIMUM	-2.3231745 01
MEDIAN	-5.4752 9E 00	STD DEV	4.2828535 00	M4	1.718642E 03	.1 QUANTILE	-1.1641-5E 01
TRIMEAN	-5.6172525 00	COEF VAR	6.8537365 01	SKEWNESS	-1.0632985 00	.25 QUANTILE (HINGE)	-8.4C5222E 00

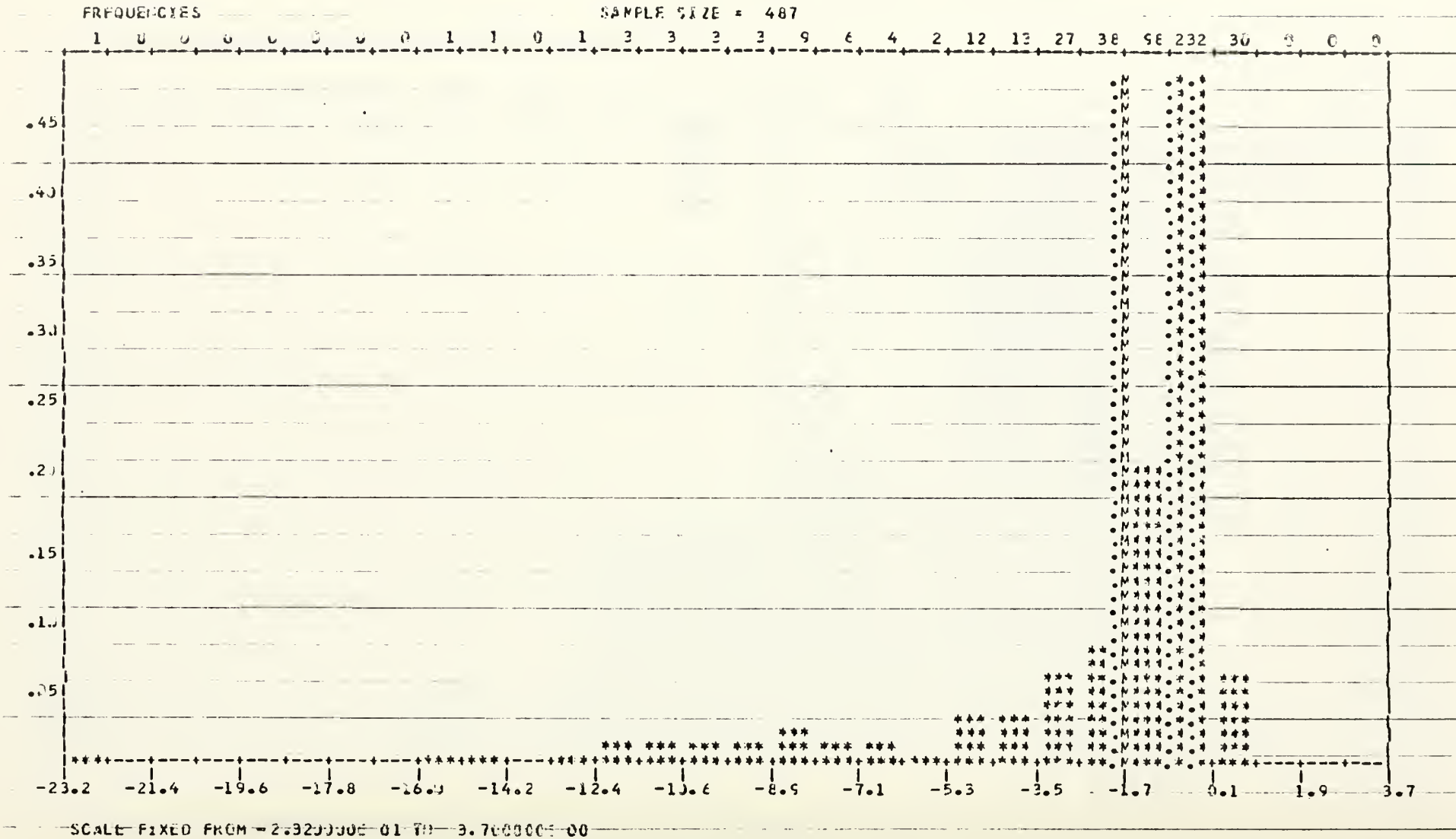
Δ_2 Errors of Advancement Model for Pay Grade E9

Δ_2 Errors of Advancement Model for Pay Grade E9



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-2.380995E 00	VARIANCE	5.1475755 00	M3	-1.5387311 01	MINIMUM	-2.692130E 01
MEDIAN	-2.090659E 00	STD DEV	2.2334[illegible]3E 00	M4	1.9853295 02	.1 QUANTILE	-5.677282E [illegible]
TRIMEAN	-2.115113E [illegible]	COEF VAR	9.9 2629E [illegible]1	SKEWNESS	-1.21 2 2L [illegible]	.25 QUANTILE (HINGE)	-3.424821E 00
MIDMEAN	-2.385792E 00	MEAN DEV	1.5875465 00	KURTOSIS	3.6505625 00	.5 QUANTILE (MEDIAN)	-2.[illegible]65915 00
MIDRANGE	-3.626763E [illegible]	RANGE	1.46[illegible]195 01	BETA1	-1.4743255 01	.75 QUANTILE (HINGE)	-1. 232525 [illegible]
		MADSPREAD	2.4[illegible]7662 00	BETA2	1.8980525 02	.9 QUANTILE	-5.300150E-01
						MAXIMUM	3.6798911 00

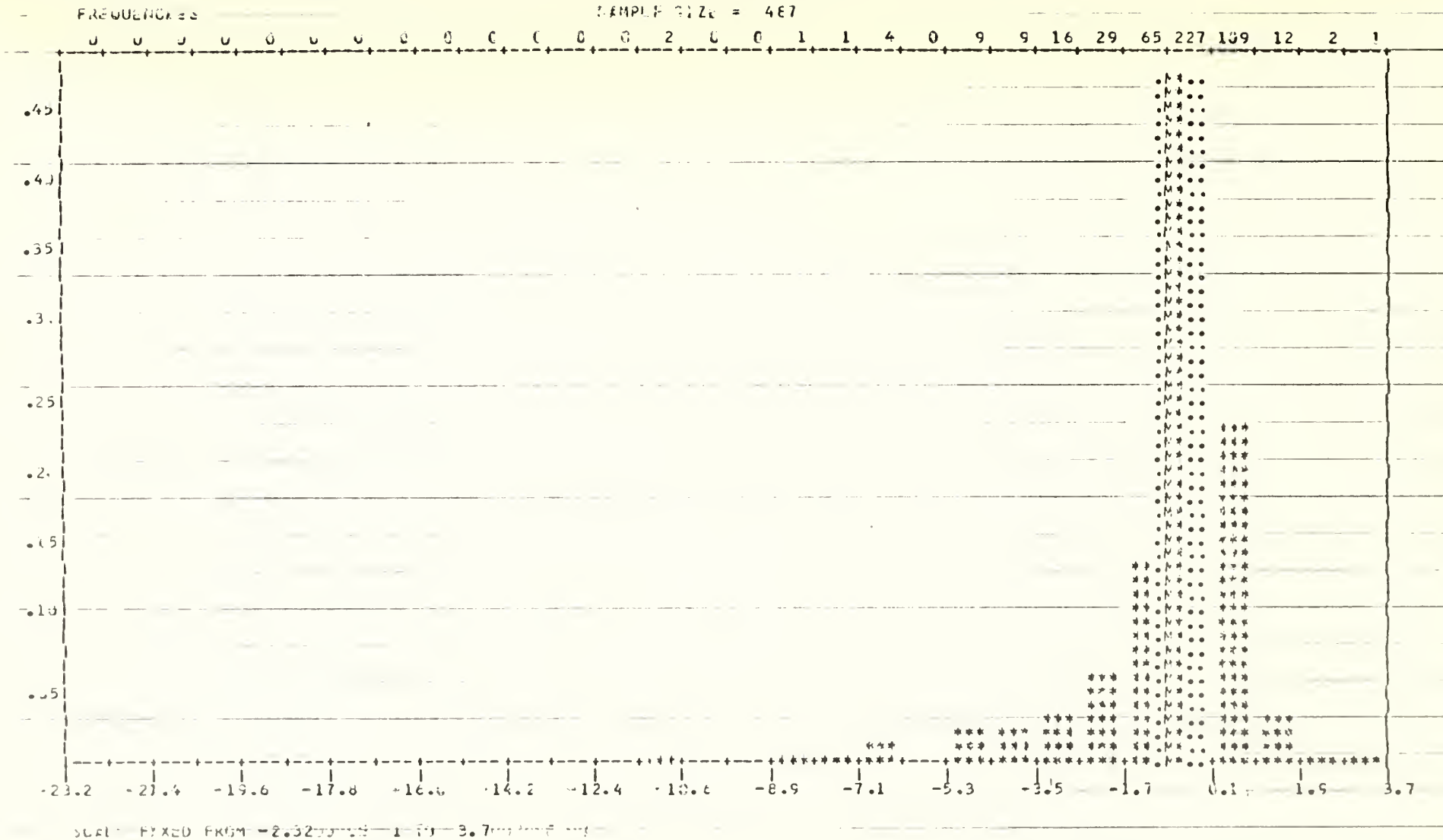
Δ_2 Errors of FAST Model for All Pay Grades



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-1.632298E 00	VARIANCE	7.173397E 00	M3	-6.227579E 01	MINIMUM	-2.320000E 01
MEDIAN	-6.713648E-01	STD-DEV	2.678322E 00	M4	6.725010E 02	.10 QUANTILE	-4.451750E 00
TRIMEAN	-8.395736E-01	COEF VAR	1.641988E 00	SKEWNESS	-3.241395E 00	.25 QUANTILE (HINGE)	-1.783245E 00
MIDRANGE	-7.733491E-01	MEAN DEV	1.415326E 00	KURTOSIS	1.305572E 01	.50 QUANTILE (MEDIAN)	-6.713648E-01

Δ_2 Errors of Advancement Model for All Pay Grades

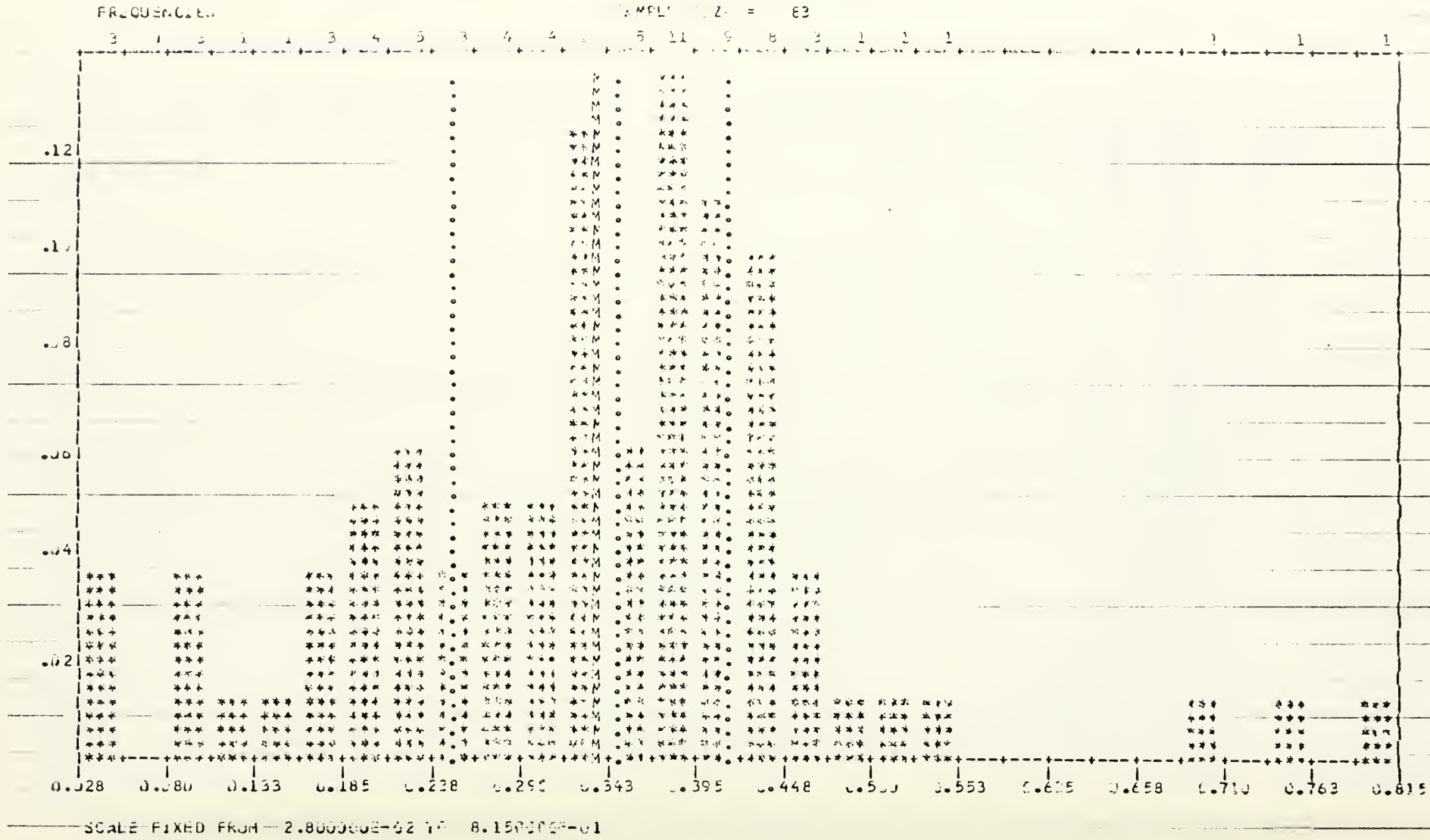
Δ_2 Errors of Advancement Model for All Pay Grades



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-6.428818E-01	VARIANCE	2.367735E 00	M3	-9.788688E 00	MINIMUM	-1.159213E 01
MEDIAN	-1.969395E-01	STD DEV	1.538744E 00	M4	7.981052E 01	.1 QUANTILE	-2.426633E 00
TRIM-MN	-2.929554E-01	COEF VAR	2.393555E 00	SKEWNESS	-2.664781E 00	.25 QUANTILE (HINGE)	-9.151496E-01
MIDMEAN	-2.656289E-01	MEAN DEV	9.125485E-01	KURTOSIS	1.123616E 01	.5 QUANTILE (MEDIAN)	-1.969395E-01
MIDRANGE	-5.627732E 00	RANGE	1.561119E 01	BETA1	9.648970E 00	.75 QUANTILE (HINGE)	1.406769E-01
		MEDSPREAD	1.055751E 00	BETA2	7.922365E 01	.9 QUANTILE	4.371367E-01
						MAXIMUM	3.679816E 00

HISTOGRAMS OF Δ_3 ERRORS, ALL RATINGS, FAST MODEL AND ADVANCEMENT MODEL

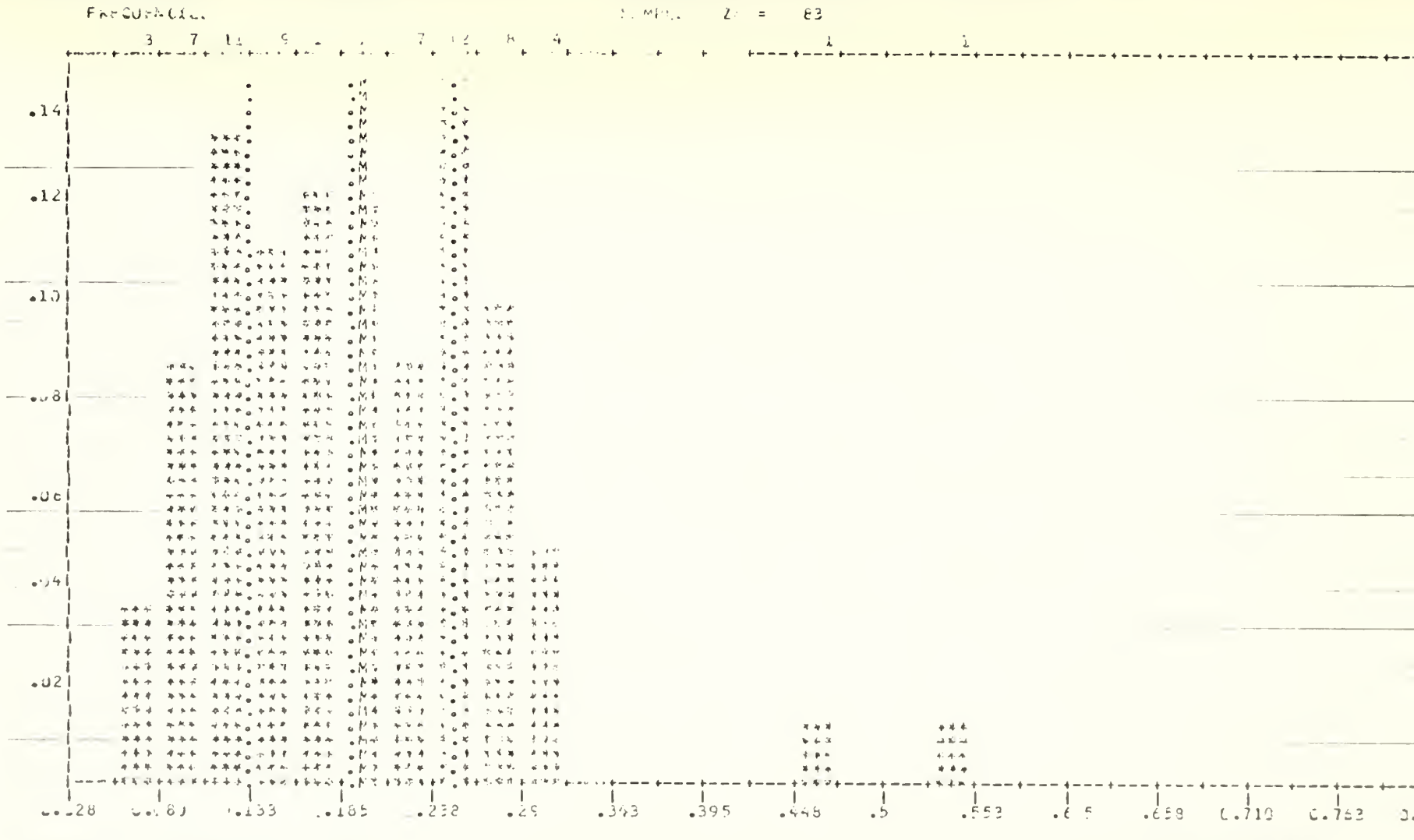
Δ_3 Errors of the FAST Model for Pay Grade E4



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	3.3391925E-01	VARIANCE	1.0577535E-2	M3	1.2223[illegible]E-3	MINIMUM	2.8[illegible]3278E-2
MEDIAN	3.4706938E-1	STD DEV	1.0291999E-01	M4	1.8410[illegible]E-3	.10 QUANTILE	1.7[illegible]E-01
TRIMEAN	3.3384792E-1	COEF VAR	4.1[illegible]E-1	SK WILSON	4.4547987E-01	.25 QUANTILE (HINGE)	2.4569245E-1
MIDRAN	3.4231479E-1	MEAN D.V.	1.[illegible]E-1	KURTOSIS	1.[illegible]	[illegible]	[illegible]

Δ_3 Errors of the Advancement Model for Pay Grade E4

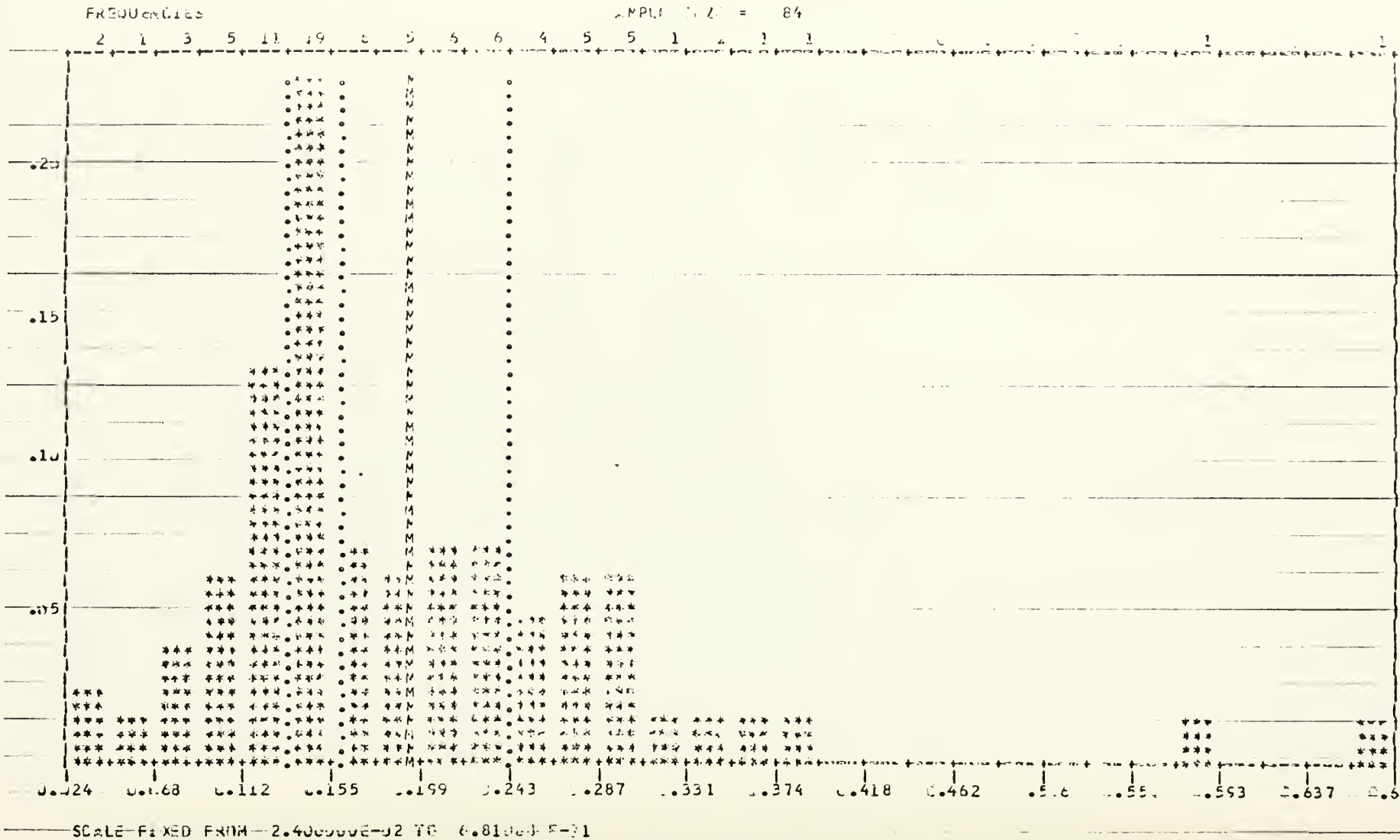
Δ_3 Errors of the Advancement Model for Pay Grade E4



F-2

CENTRAL TENDENCY		SPREAD		HIGHER MOMENTS		DISTRIBUTION	
MEAN	1.9[illegible]	VARIANCE	6.7[illegible]	M3	6.6[illegible]	MINIMUM	5.[illegible]
MEDIAN	1.885,56	MAD	8.2[illegible]	M4	2.85[illegible]	.1 QUANTILE	6.[illegible]
TRIMEAN	1.88[illegible]	STD DEV	9.[illegible]	KURTOSIS	1.19[illegible]	.25 QUANTILE (HINGE)	1.[illegible]
MIDRANGE	1.9[illegible]	MEAN DEV	6.[illegible]	KURTOSIS	3.21[illegible]	.5 QUANTILE (MEDIAN)	1.[illegible]
MIDQUARTILE	1.[illegible]	RANGE	4.[illegible]	B1	6.42[illegible]	.75 QUANTILE (HINGE)	2.[illegible]
GEOM MEAN	1.7[illegible]	MEDIAN DEV	1.2[illegible]	B2	2.75[illegible]	.9 QUANTILE	2.[illegible]
HARM MEAN	1.63[illegible]					MAXIMUM	5.[illegible]

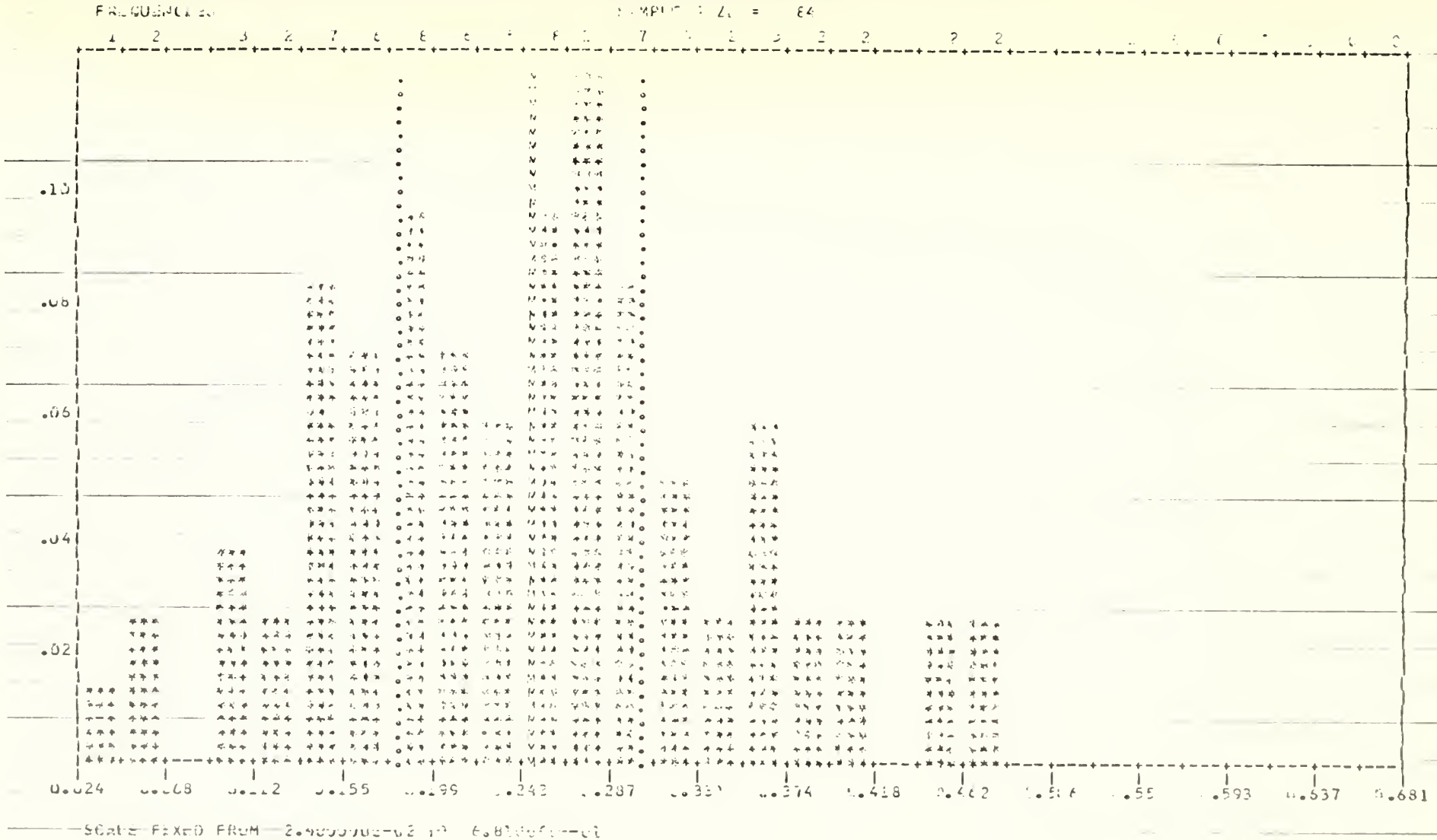
Δ_3 Erros of the FAST Model for Pay Grade E5



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.92 [illegible] 1	VARIANCE	1.[illegible]36314[illegible]-02	M3	2.[illegible]95739[illegible]-03	MINIMUM	4.[illegible]99665-02
MEDIAN	1.595224[illegible]-01	STD DEV	1.[illegible]79955[illegible]-01	M4	1.[illegible]08337[illegible]-03	.1 QUANTILE	9.655652[illegible]-02
TRIMEAN	1.721599[illegible]-01	SMALE VAR	5.[illegible]2[illegible]-01	SKEWNESS	2.[illegible]76135[illegible]	.25 QUANTILE (HINGE)	1.[illegible]27916[illegible]-01
WINSORIZED MEAN	1.[illegible]87475[illegible]-01	MEAN DEV	6.[illegible]97[illegible]66[illegible]-02	KURTOSIS	7.[illegible]22[illegible]230[illegible]	.5 QUANTILE (MEDIAN)	1.595224[illegible]-01

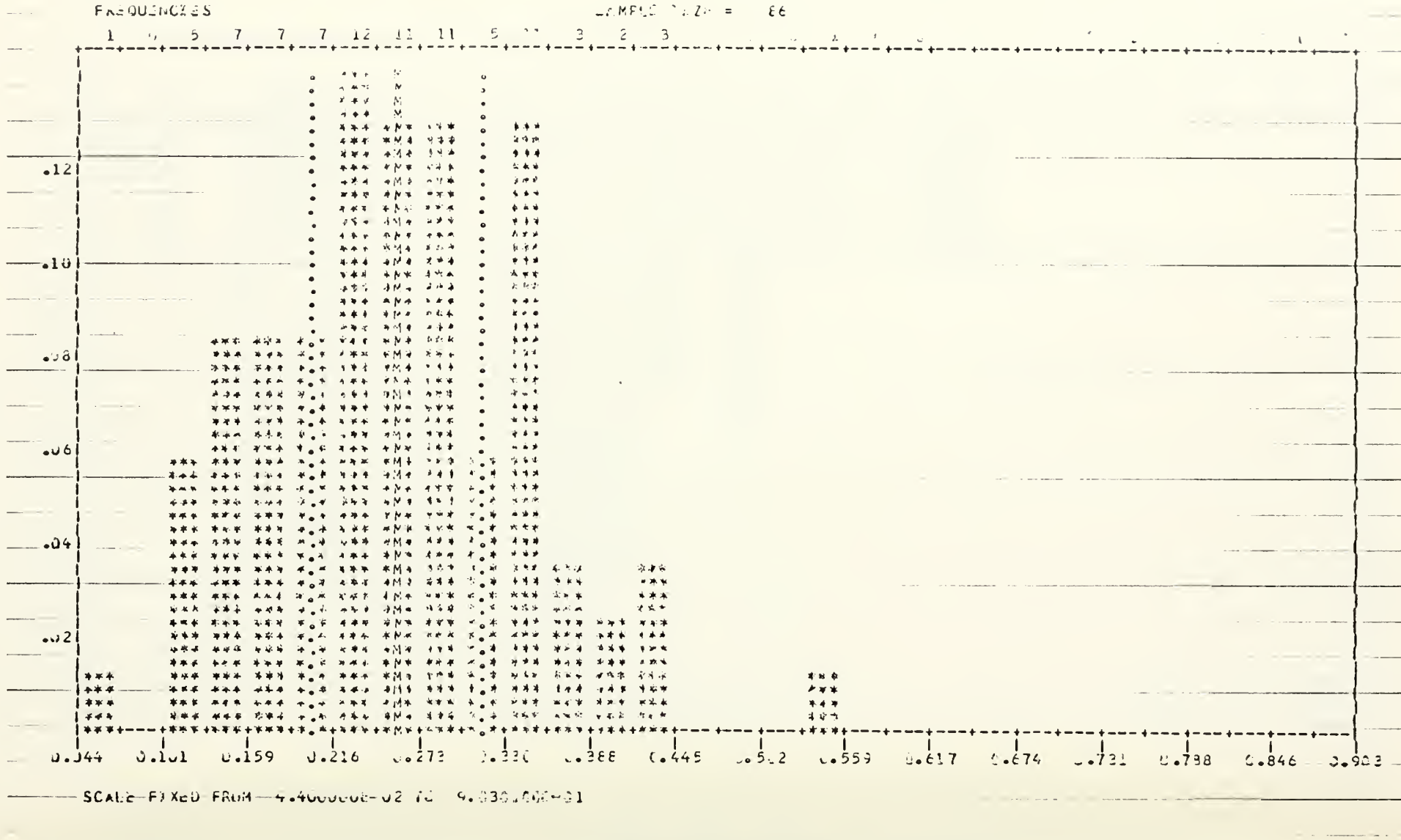
Δ_3 Erros of the Advancement Model for Pay Grade E5

Δ_3 Errors of the Advancement Model for Pay Grade E5

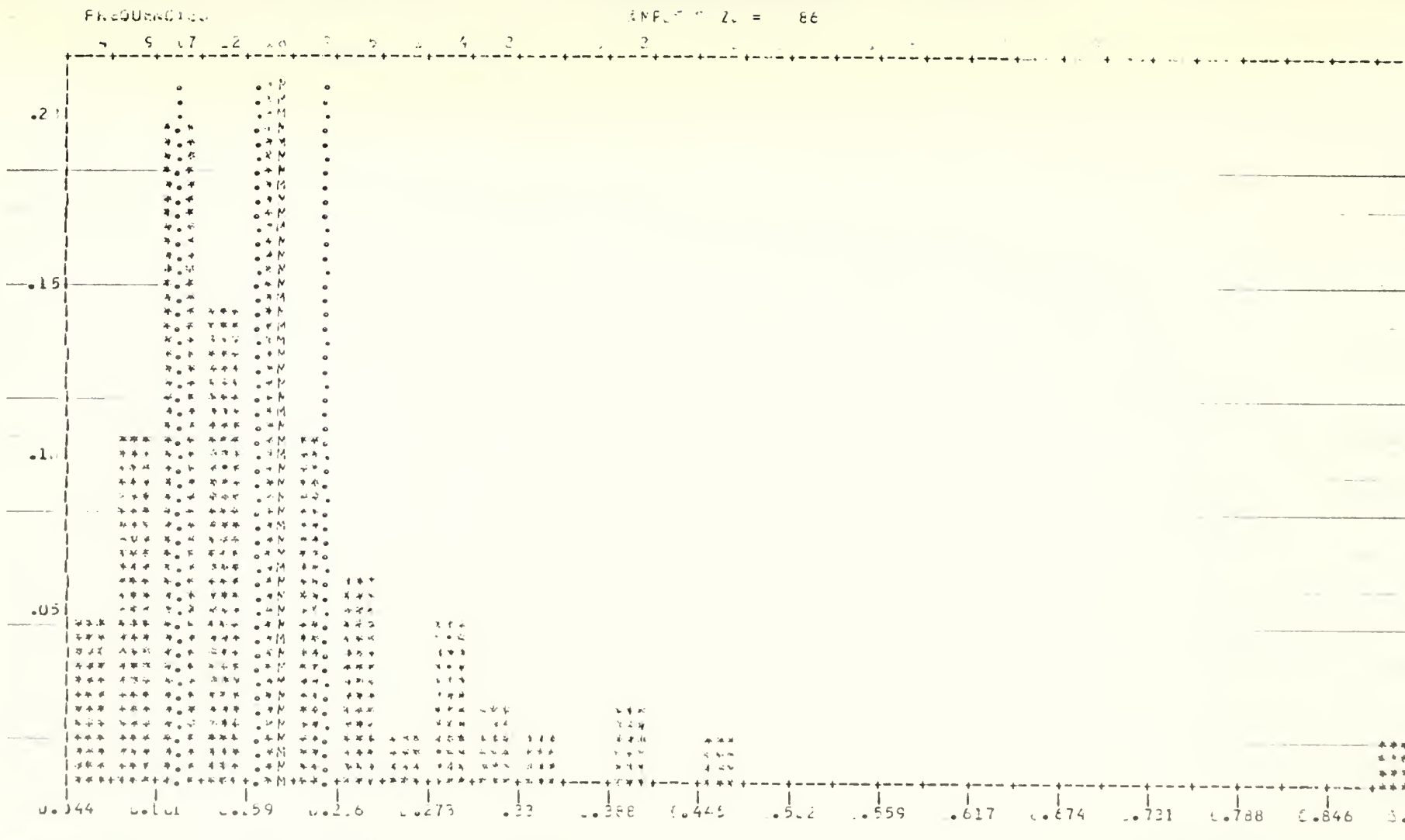


CENTRAL TENDENCY		SPREAD		HIGHER ORDER MOMENTS		DISTRIBUTION	
MEAN	2.405754E-01	VARIANCE	5.225[illegible]E-03	M3	[illegible]	MINIMUM	2.431661[illegible]E-02
MEDIAN	2.458106E-01	STD DEV	7.[illegible]E-02	M4	2.328[illegible]E-04	.05 QUANTILE	1.268152E-01
TRIMEAN	2.438304E-01	C.V.	3.[illegible]E-01	SKEWNESS	1.941975E-01	.25 QUANTILE (HINGE)	1.803529E-01
MIDRANGE	2.429[illegible]E-01	RANGE	7.[illegible]E-02	KURTOSIS	1.421213E-01	.5 QUANTILE (MEDIAN)	2.458106E-01
MIDSPREAD	2.5[illegible]877E-01	MAD	4.[illegible]E-02	B1	1.[illegible]E-04	.75 QUANTILE (HINGE)	3.[illegible]74755E-01
GEOM MEAN	2.247966E-01	AVEDEV	1.[illegible]E-01	B2	2.274356E-04	.95 QUANTILE	3.[illegible]E-01
HARM MEAN	1.914214E-01					MAXIMUM	4.778588E-01

Δ_3 Errors of the FAST Model for Pay Grade E6

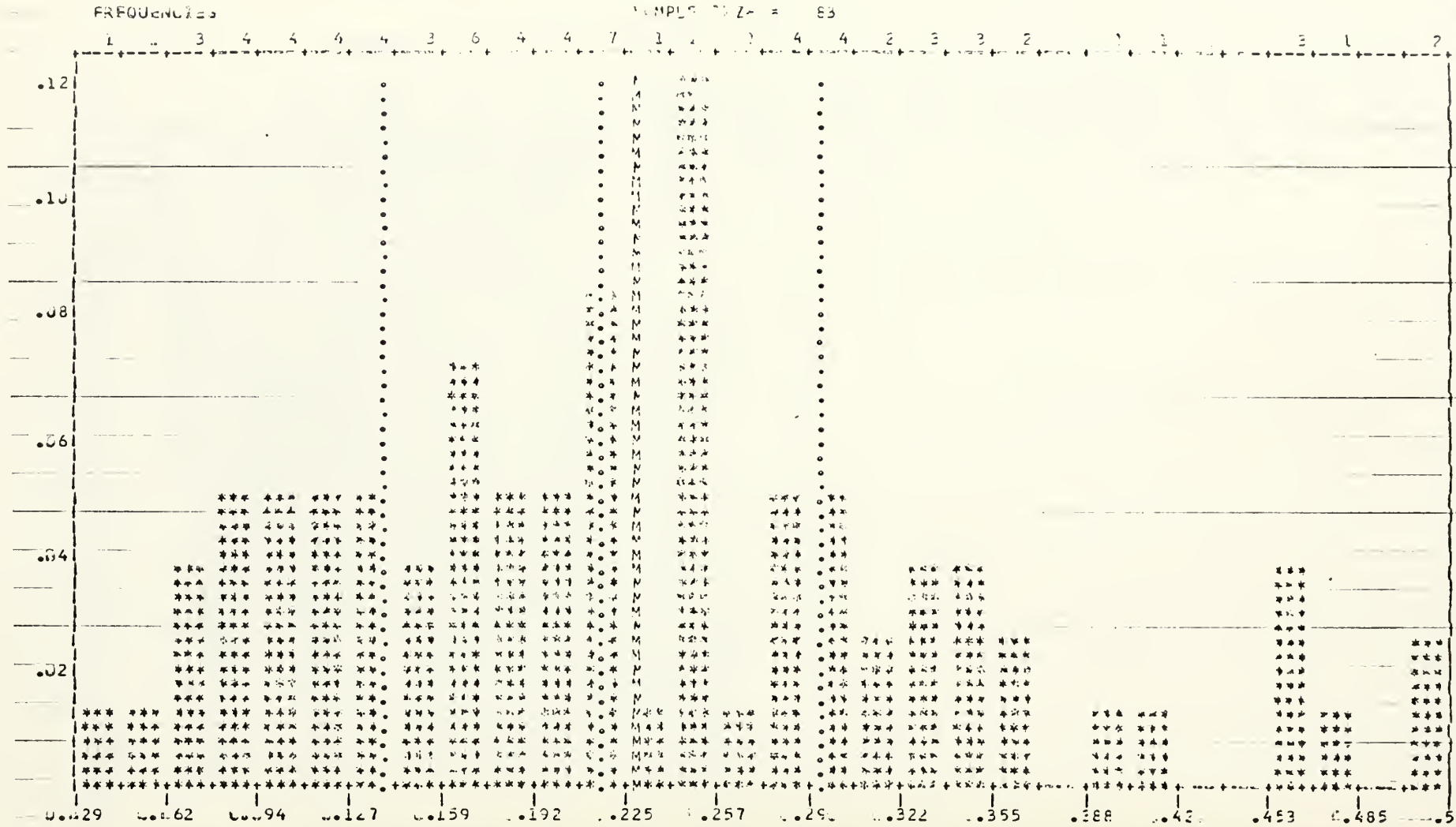


Δ_3 ERRORS OF THE ARMY-WIDE MODEL FOR PAY GRADE E6



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION		
MEAN	1.78423	RANGE	1.2568555	M3	2.1287825	MINIMUM		4.3941555-02
MEDIAN	1.6135485-01	STD DEV	1.2554715	M4	3.5553565-03	.1 QUANTILE		6.8245515-02
TRIMEAN	1.5355475-01	SEMI IQR	6.3383835-01	SKEWNESS	2.556835	.25 QUANTILE	(HINGE)	1.1266375-01
MIDMEAN	1.5e397	MEAN DEV	6.5942955-02	KURTOSIS	1.9121585 01	.5 QUANTILE	(MEDIAN)	1.6135485-01
MIDRANGE	4.7e5625	RANGE	3.5928235	B(1)	4.951224	.75 QUANTILE	(HINGE)	2.2765455-01
GEOM MEAN	1.567667	MID SPREAD	9.1	B(2)	3.5962565	.9 QUANTILE		2.8642355-01
HARM MEAN	1.399746					MAXIMUM		9.3322385-01

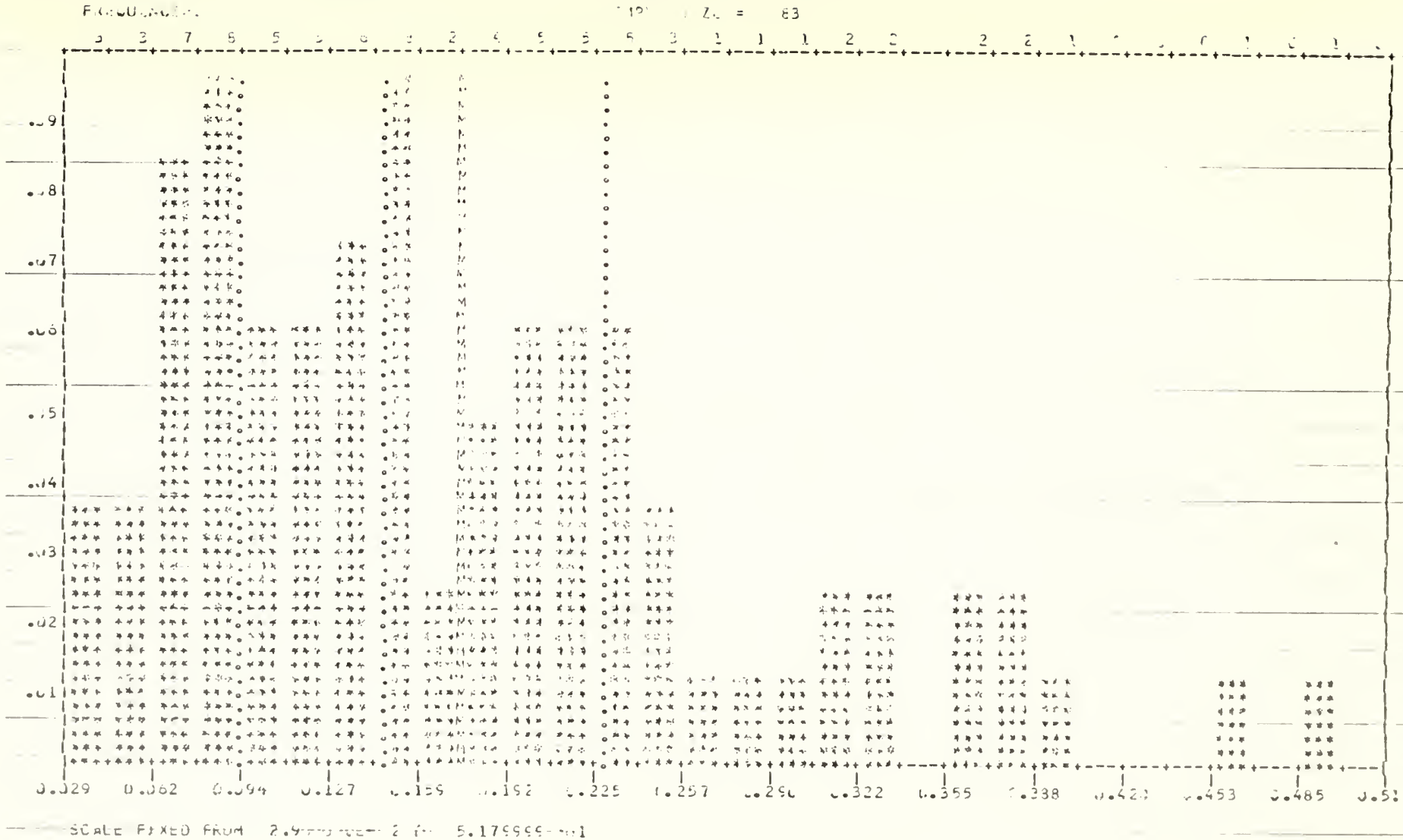
Δ_3 Errors of the FAST Model for Pay Grade E7



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.282735E-01	VARIANCE	1.258434E-02	M3	5.476198E-04	MINIMUM	4.455852E-02
MEDIAN	2.137603E-01	STD DEV	1.121769E-01	M4	4.711235E-04	.1 QUANTILE	8.574966E-02
TRIMEAN	2.147267E-01	COEF VAR	4.914277E-01	SKEWNESS	3.714567E-01	.25 QUANTILE (HINGE)	1.361125E-01
MIDMEAN	2.164802E-01	MEAN DEV	8.343[illegible]E-02	KURTOSIS	-2.5[illegible]22E-02	.5 QUANTILE (MEDIAN)	2.137603E-01

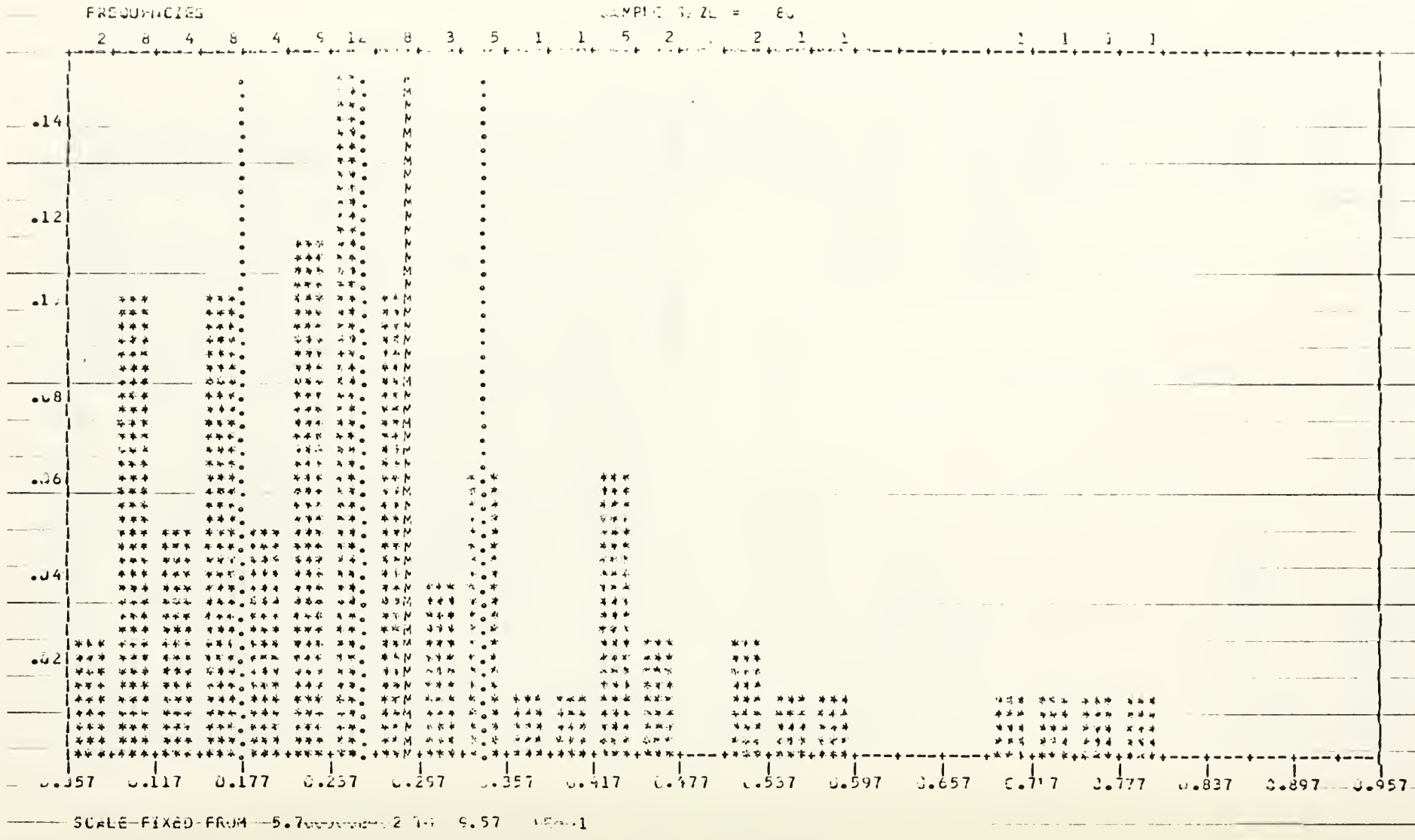
A₃ Errors of the Advancement Model for Pay Grade E7

Δ_3 Errors of the Advancement Model for Pay Grade E7

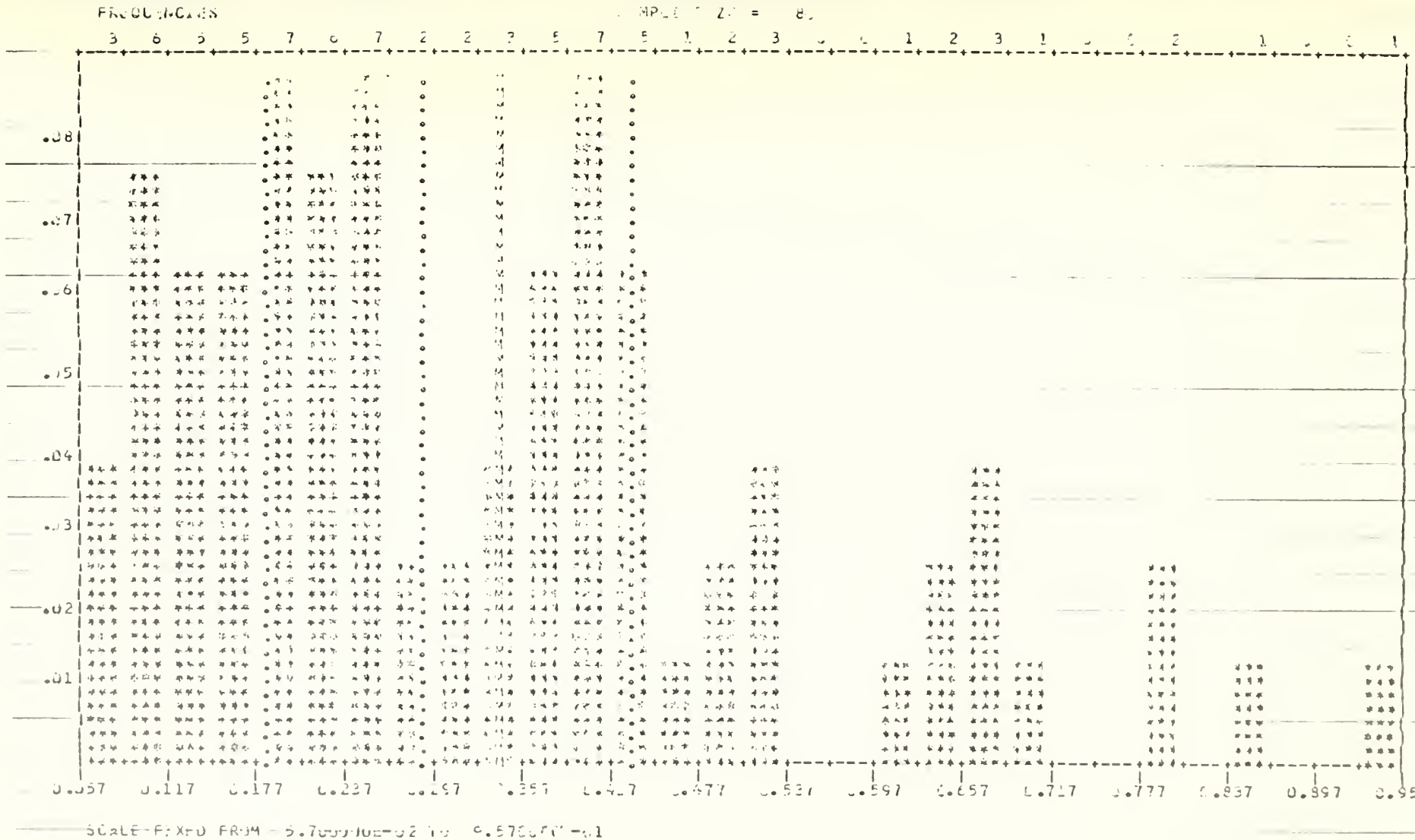


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION		
MEAN	1.747953E-01	VARIANCE	1.5 3344E-2	M3	1.2498E-3	MINIMUM		2.8671328E-02
MEDIAN	1.466857E-01	STD DEV	1. 2488E-1	M4	3.8141E0-04	.10 QUANTILE		6.2137B2E-02
TRIMEAN	1.5 6647E-01	COEF VAR	5.8 2335E-1	SKEWNESS	5.5211E9-01	.25 QUANTILE (LOWER)		9.3151421E-02
MIDMEAN	1.5794321E-01	MEAN DEV	7.6278437E-2	KURTOSIS	9.5596838E-1	.5 QUANTILE (MEDIAN)		1.4668971E-01
MIDRANGE	2.5735121E-1	RANGE	4.5736567E-01	B1 1/2	5.8823685E-04	.75 QUANTILE (UPPER)		2.2795668E-01
QUAD MEAN	1.4511984E-01	MEAN PROP DEV	1.3482266E-1	B2	3.7 8689E-4	.9 QUANTILE		3.2 6475E-1
HARM MEAN	1.1861192E-01					MAXIMUM		4.8E 311E-01

Δ_3 Errors of the FAST Model for Pay Grade E8



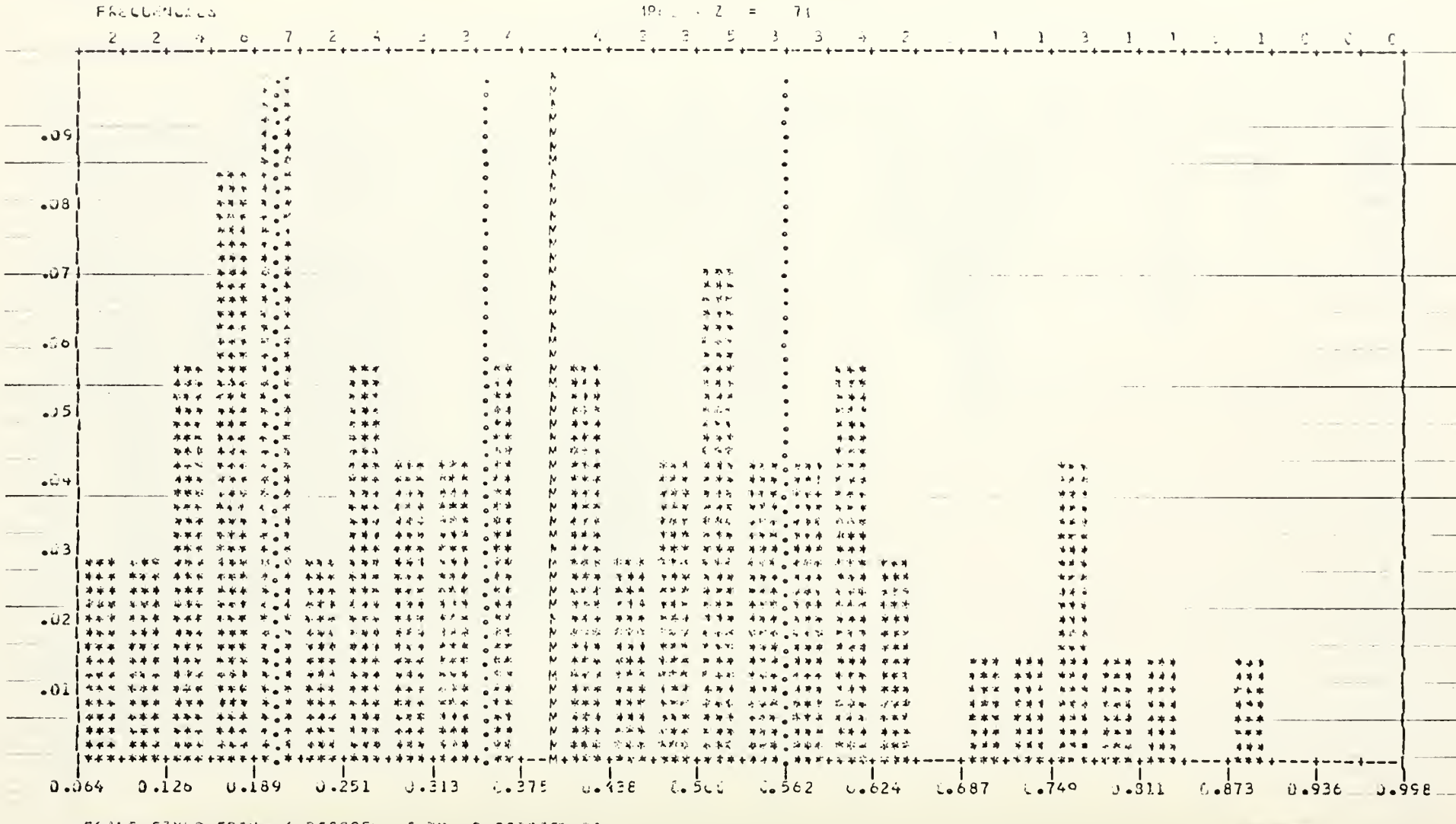
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.83x225[illegible]-03	VARIANCE	2.55 6125-.2	M3	5.5555147[illegible]-03	MINIMUM	7.6762915-.2
MEDIAN	2.528453[illegible]-01	STD DEV	1.597 [illegible]-1	M4	3.125 125[illegible]-3	.1 QUANTILE	3.164522[illegible]-01
TRIMEAN	2.591420[illegible]-01	CHEF VAR	5.642825[illegible]-01	SKEWNESS	1.36[illegible]23[illegible] 00	.25 QUANTILE (MIDGET)	2.718795[illegible]-01

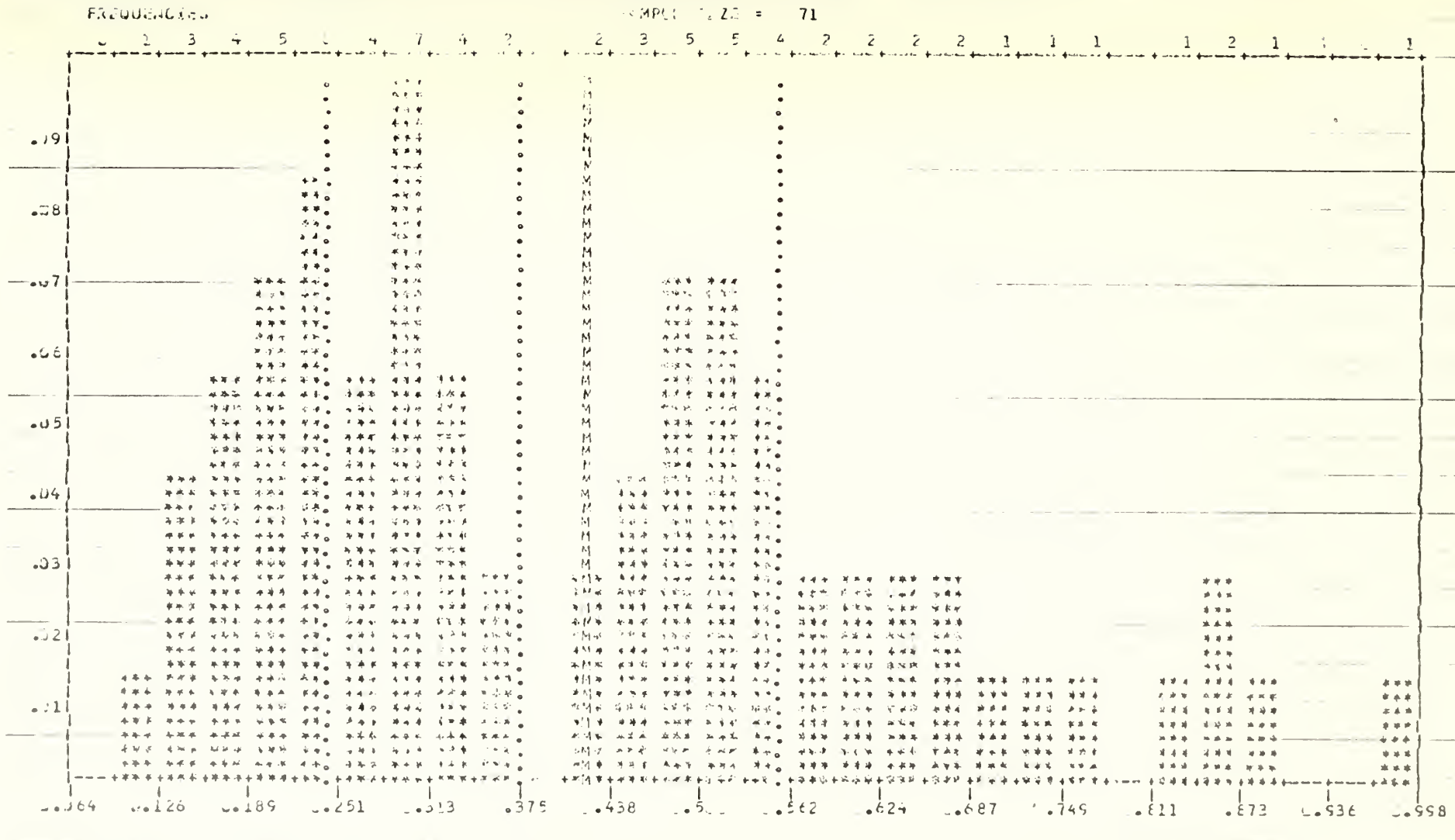


SCALE-FIXED FROM -5.700000E-02 TO 6.570000E-01

CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	3.36[illegible]E-1	VAR ANCE	4.[illegible]E-2	M3	7.91[illegible]E-3	MINIMUM	6.[illegible]E-2
MEDIAN	2.82[illegible]E-1	STD DEV	2.[illegible]E-1	M4	5.[illegible]E-3	.1% QUANTILE	1.[illegible]E-1
TRIMEAN	2.93[illegible]E-1	COEF VAR	6.[illegible]E-1	SKEWNESS	5.[illegible]E-1	.25 QUANTILE (FENCE)	1.[illegible]E-1
MIDMEAN	3.[illegible]E-1	MEAN DEV	1.[illegible]E-1	KURTOSIS	4.[illegible]E-1	.5 QUANTILE (MEDIAN)	2.[illegible]E-1
MIDRANGE	5.[illegible]E-1	RANGE	6.[illegible]E-1	B1	7.[illegible]E-3	.75 QUANTILE (FENCE)	4.[illegible]E-1
GEOM MEAN	2.[illegible]E-1	I Q RANGE	2.[illegible]E-1	B2	5.[illegible]E-3	.9 QUANTILE	6.[illegible]E-1
HARM MEAN	2.[illegible]E-1					MAXIMUM	9.[illegible]E-1

Δ_3 Errors of the FAST Model for Pay Grade E9





CENTRAL TENDENCY

MEAN	4.198493E-01
MEDIAN	3.709367E-01
TRIMEAN	3.831444E-01
MIDMEAN	3.916536E-01
MIDRANGE	5.467815E-01
GEOM MEAN	3.089969E-01
HARM MEAN	3.212955E-01

SPREAD

VARIANCE	4.420765E-02
STD DEV	2.102078E-01
COEF VAR	5.007298E-01
MEAN DEV	1.757795E-01
RANGE	9.181298E-01
MEDSPREAD	3.239511E-01

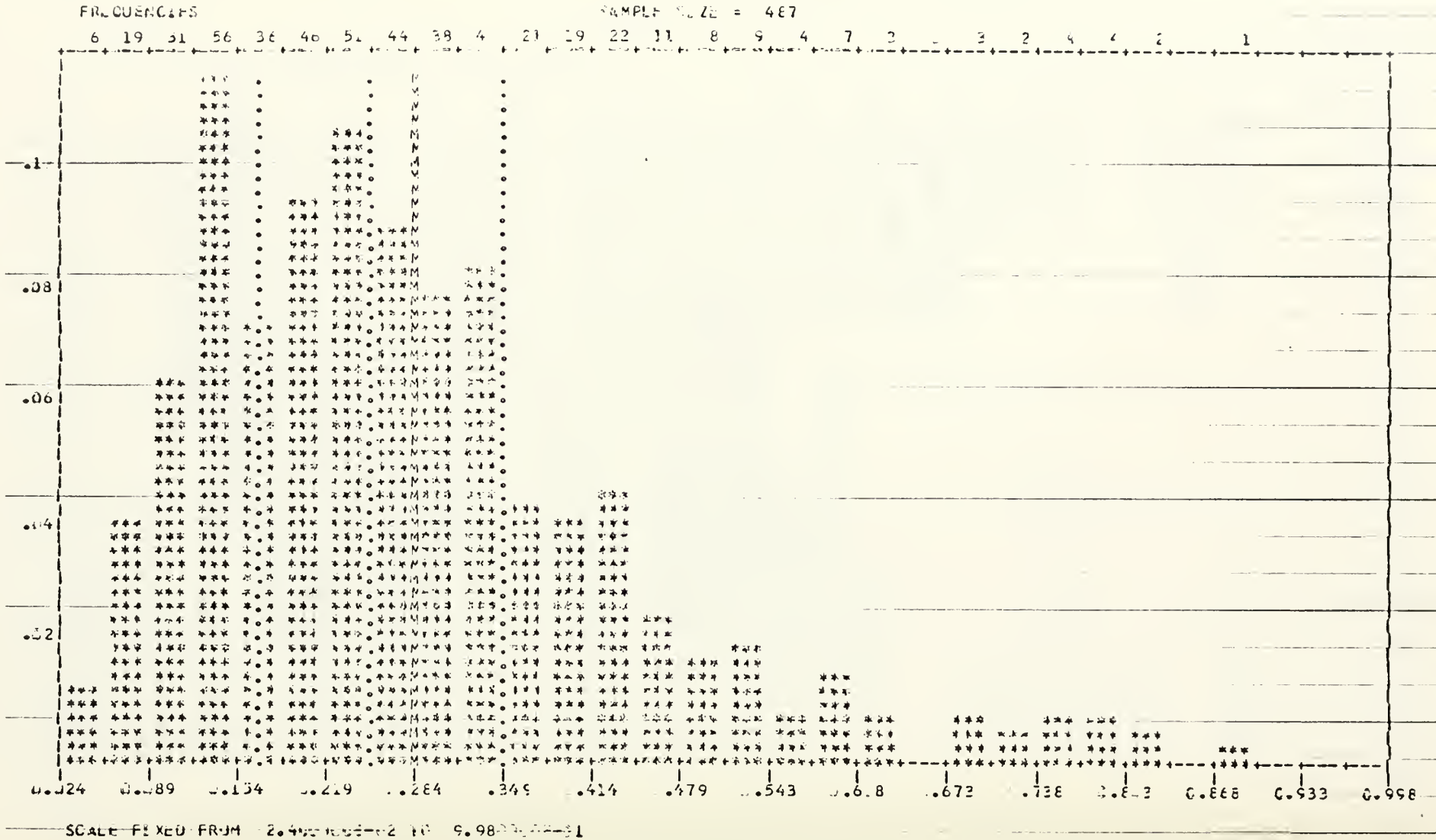
HIGHER CENTRAL MOMENTS

M3	6.213827E-03
M4	5.211589E-03
SKEWNESS	6.716973E-01
KURTOSIS	-3.467635E-01
B1	5.944155E-03
B2	5.066868E-03

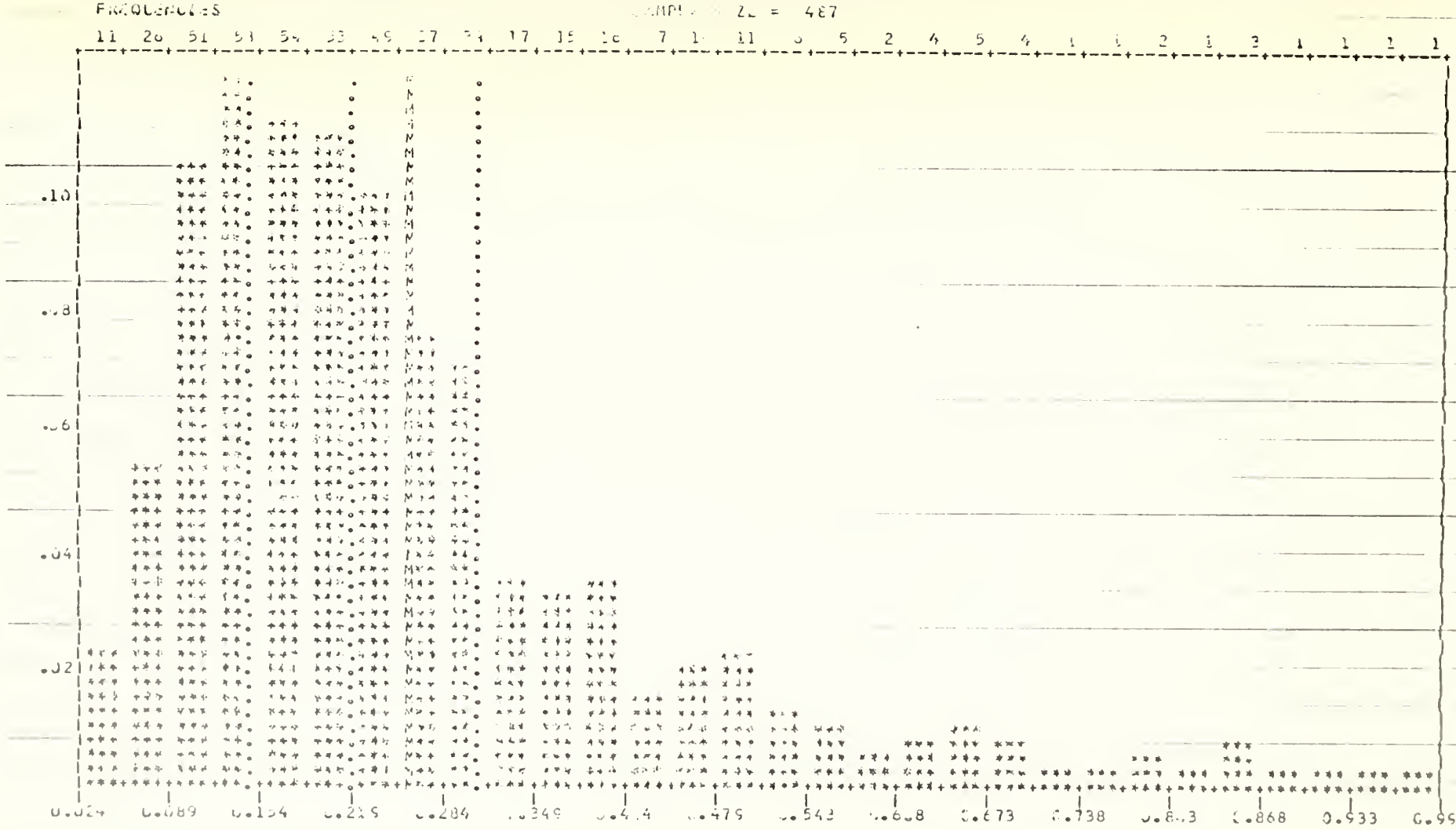
DISTRIBUTION

MINIMUM		5.584645E-02
.10	QUANTILE	1.812732E-01
.25	QUANTILE (FENCE)	2.383567E-01
.50	QUANTILE (MEDIAN)	3.709367E-01
.75	QUANTILE (HINGE)	5.523 78E-01
.90	QUANTILE	6.746172E-01
MAXIMUM		9.9772342E-01

Δ_3 Errors of the FAST Model for All Pay Grades



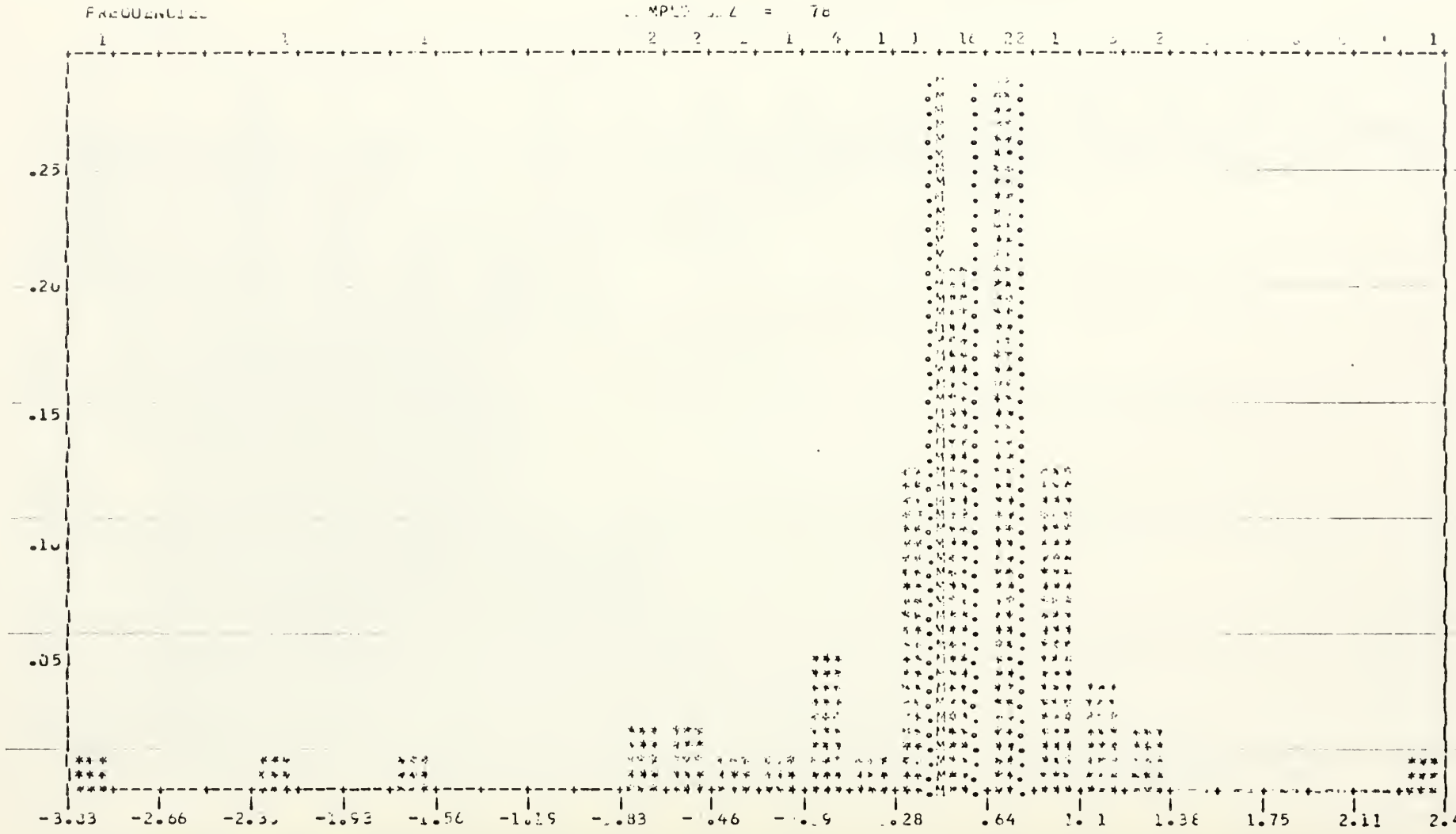
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.785[illegible]E-01	VARIANCE	2.34862[illegible]E-02	M3	4.34[illegible]E-03	MINIMUM	2.A[illegible]E-02
MEDIAN	2.5[illegible]E-01	STD DEV	1.53252[illegible]E-1	M4	2.6[illegible]E-03	.1 QUANTILE	1.14[illegible]E-1
TRIMEAN	2.539[illegible]E-1	COEF VAR	5.5[illegible]E-01	SKEWNESS	1.20[illegible]	.25 QUANTILE (HINGE)	1.65[illegible]E-1
MIDMEAN	2.535[illegible]E-1	MEAN DEV	1.[illegible]E-1	KURTOSIS	2.55[illegible]E-03	.75 QUANTILE	[illegible]



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	6.53629 E-01	VARIANCE	2.74626E- 2	M3	7.501915E- 3	MINIMUM	2.431661E-02
MEDIAN	2.17 51?E-01	STD DEV	1.6571E? E-1	M4	4.68830E--03	.1 QUANTILE	6.69?3?E-02
TRIMEAN	2.17.23?E-??	COEF VAR	6.53?8?2E- 1	SKEWNESS	1.661572- ?	.25 QUANTILE (EXCESS)	1.429 98E- 1
MIDMEAN	2.15558E-??	MEAN DEV	1.??49?8E- 1	KURTOSIS	3.?16?75E- ?	.5 QUANTILE (MEDIAN)	2.1? 514?-01
MIDRANGE	5.11.197E-01	RANGE	5.?34?6?E-01	B1	7.515?93?-03	.75 QUANTILE (FENCE)	3.?? 8?8?-01
GEOM MEAN	2.1? 552?-?1	MEAN SQ	1.?2171 E- 1	B2	4.65912 E-03	.9 QUANTILE	4.77?5EE-?1
HARM MEAN	1.718923E-01					MAXIMUM	9.977234E-01

HISTOGRAMS OF Δ_1 ERRORS, HIGH VOLUME RATINGS ONLY, FAST MODEL AND ADVANCEMENT MODEL

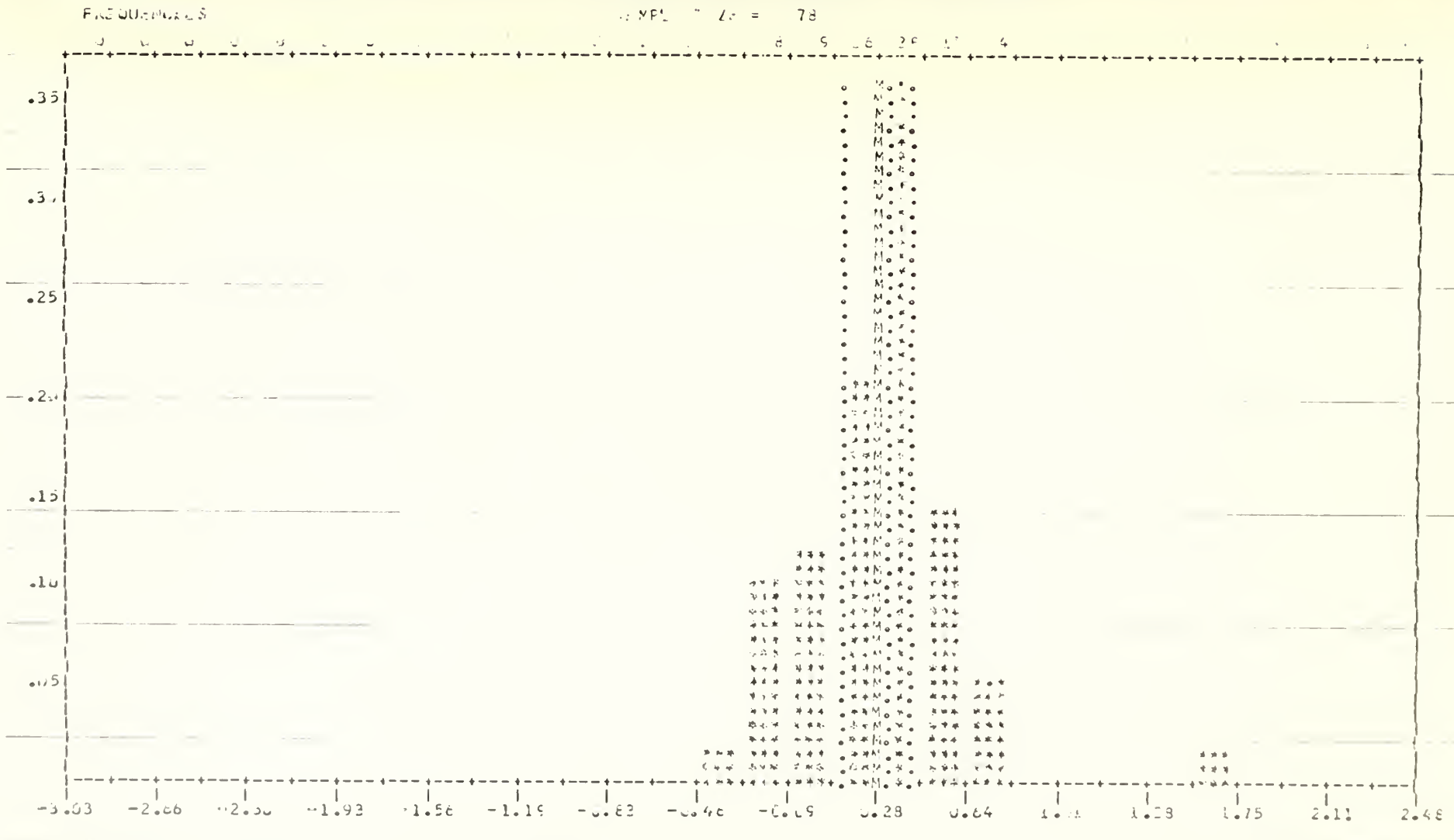
Δ_1 Errors of the FAST Model for Pay Grade E4 (High Volume Ratings Only)



SCALE FIXED FROM -3.03 TO 2.48

CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	4.659358E-01	VARIANCE	5.322131E-01	M3	8.949925E-01	MINIMUM	-3.031521E+00
MEDIAN	6.200377E-01	STD DEV	7.295227E-01	M4	3.227852E+00	.10 QUANTILE	-4.631233E-01
TRIMEAN	6.086544E-01	COEFF VAR	1.565698E+00	SKEWNESS	-2.351482E+00	.25 QUARTILE (MEDIAN)	4.117564E-01
MIDPOINT	6.247578E-01	MEAN DEV	5.982125E-01	KURTOSIS	8.604501E+00	.75 QUARTILE	1.000000E+00

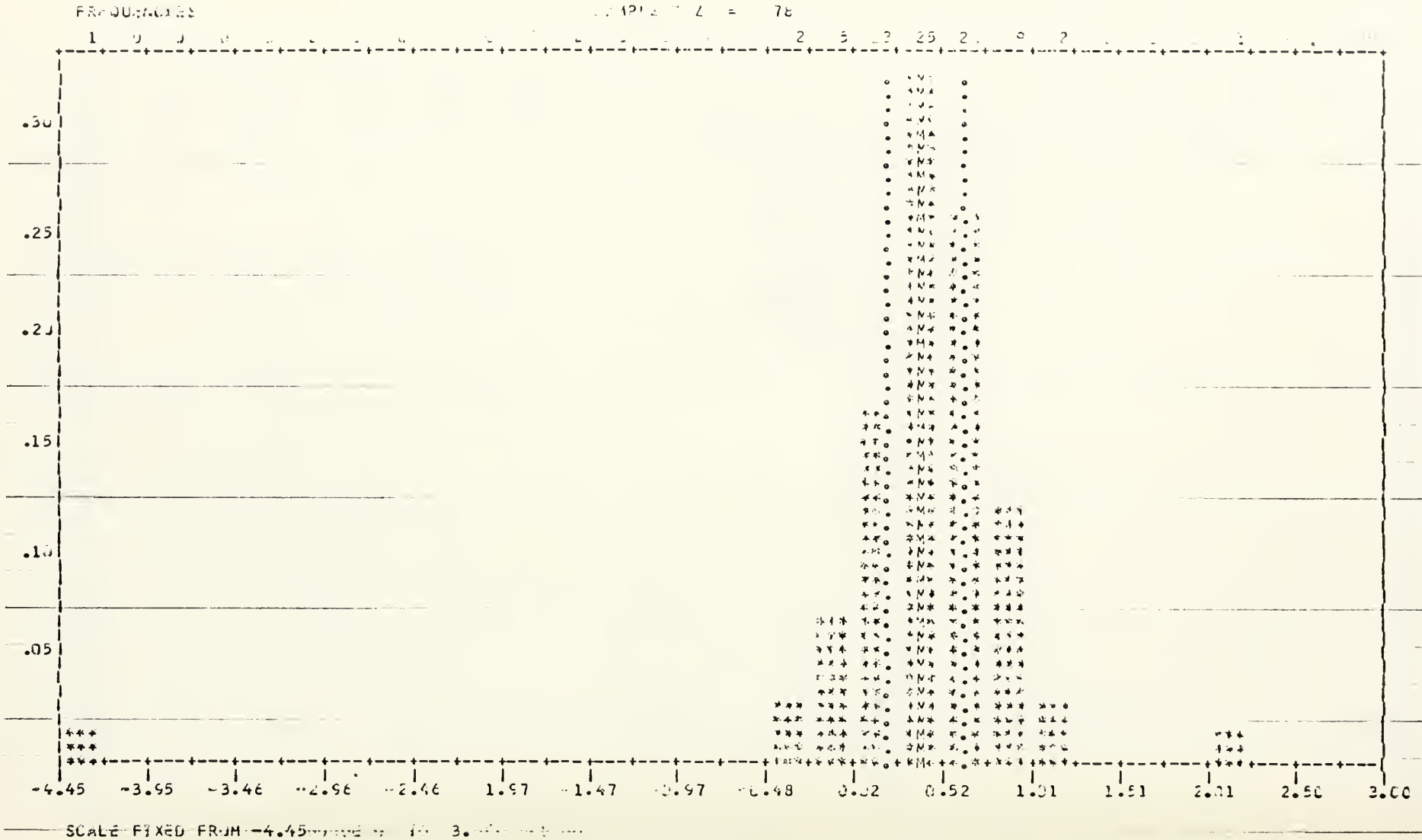
Δ_1 Errors of the Advancement Model for Pay Grade E4 (High Volume Ratings Only)



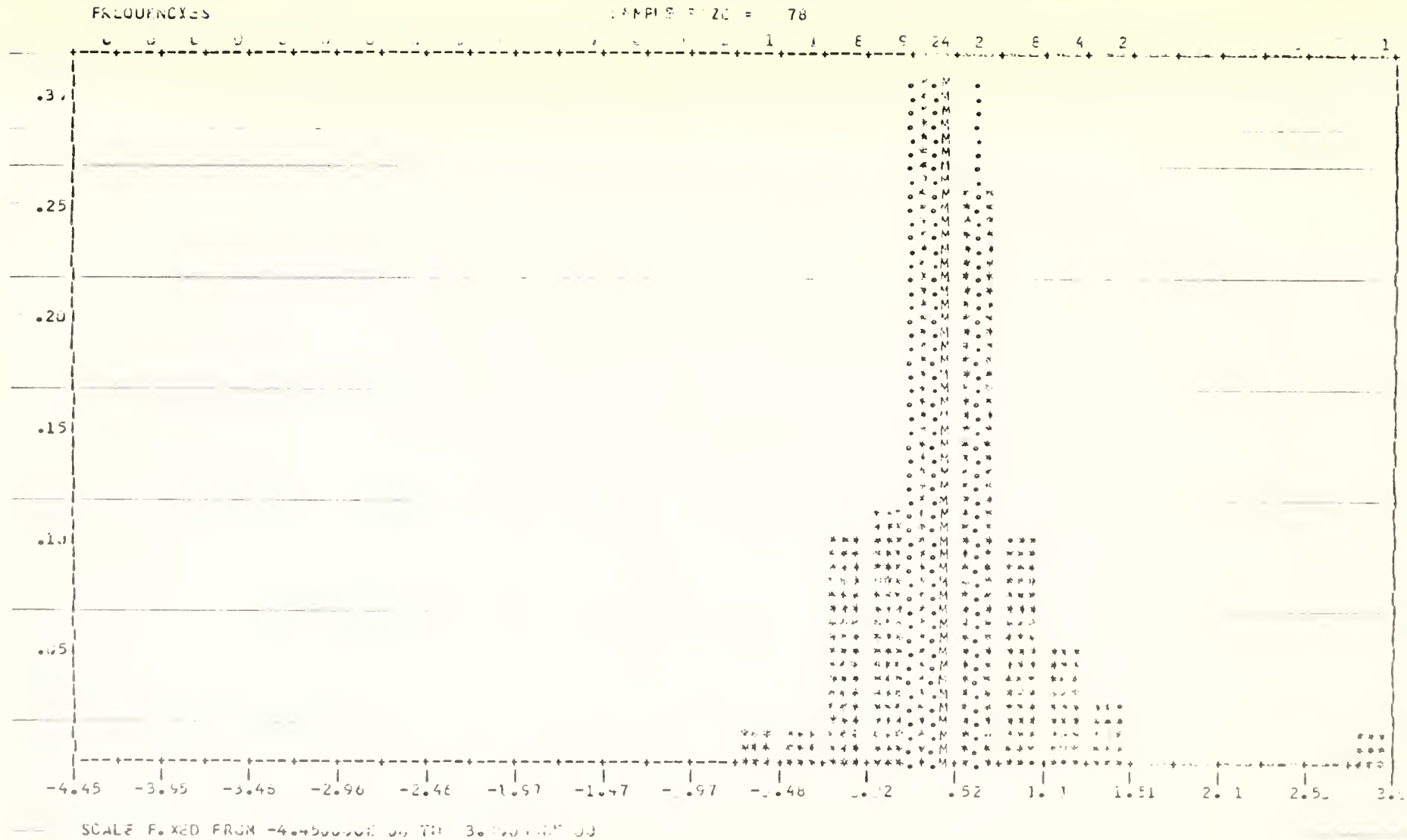
SCALE FIXED FROM -3.03 TO 2.48 BY .03

CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	6.838751E-01	VARIANCE	8.585447E-02	M3	1.917298E-02	MINIMUM	-2.997293E-01
MEDIAN	3.12 871E-01	STD DEV	2.93 [illegible]	M4	5.197845E-02	.1 QUANTILE	-1.166367E-01
TR.MEAN	2.9980[illegible]	COEF VAR	4.32176E [illegible]	SKEWNESS	7.621559E-01	.25 QUANTILE (HRANGE)	1.955569E-01
MIDMEAN	3.05530 [illegible]	MEAN DEV	2.99 51[illegible]	KURTOSIS	4.05176 [illegible]	.5 QUANTILE (MEDIAN)	3.12 871E-01
MIDRANGE	6.527753E-01	RANGE	1.0[illegible]	B1/M1	1.844187E-02	.75 QUANTILE (HRANGE)	4.557[illegible]
		M.DEP.MED	2.99152[illegible]	B2/M2	4.966547E-02	.9 QUANTILE	5.74173[illegible]
						MAX,MUM	1.6[illegible]

Δ_1 Errors of the FAST Model for Pay Grade E5 (High Volume Ratings Only)

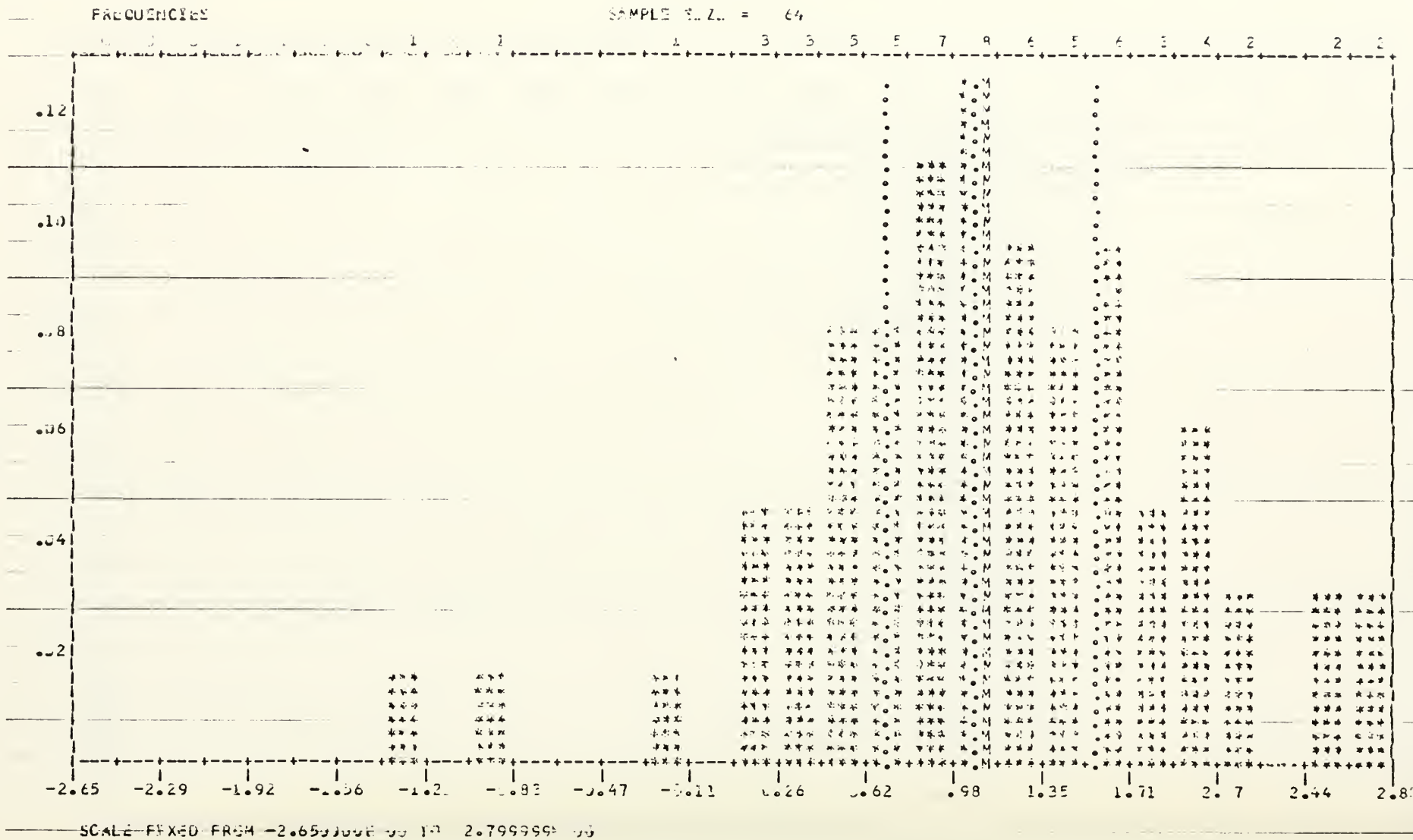


E_1 Errors of the Advancement Model for Pay Grade E3 (High Volume Ratings Only)

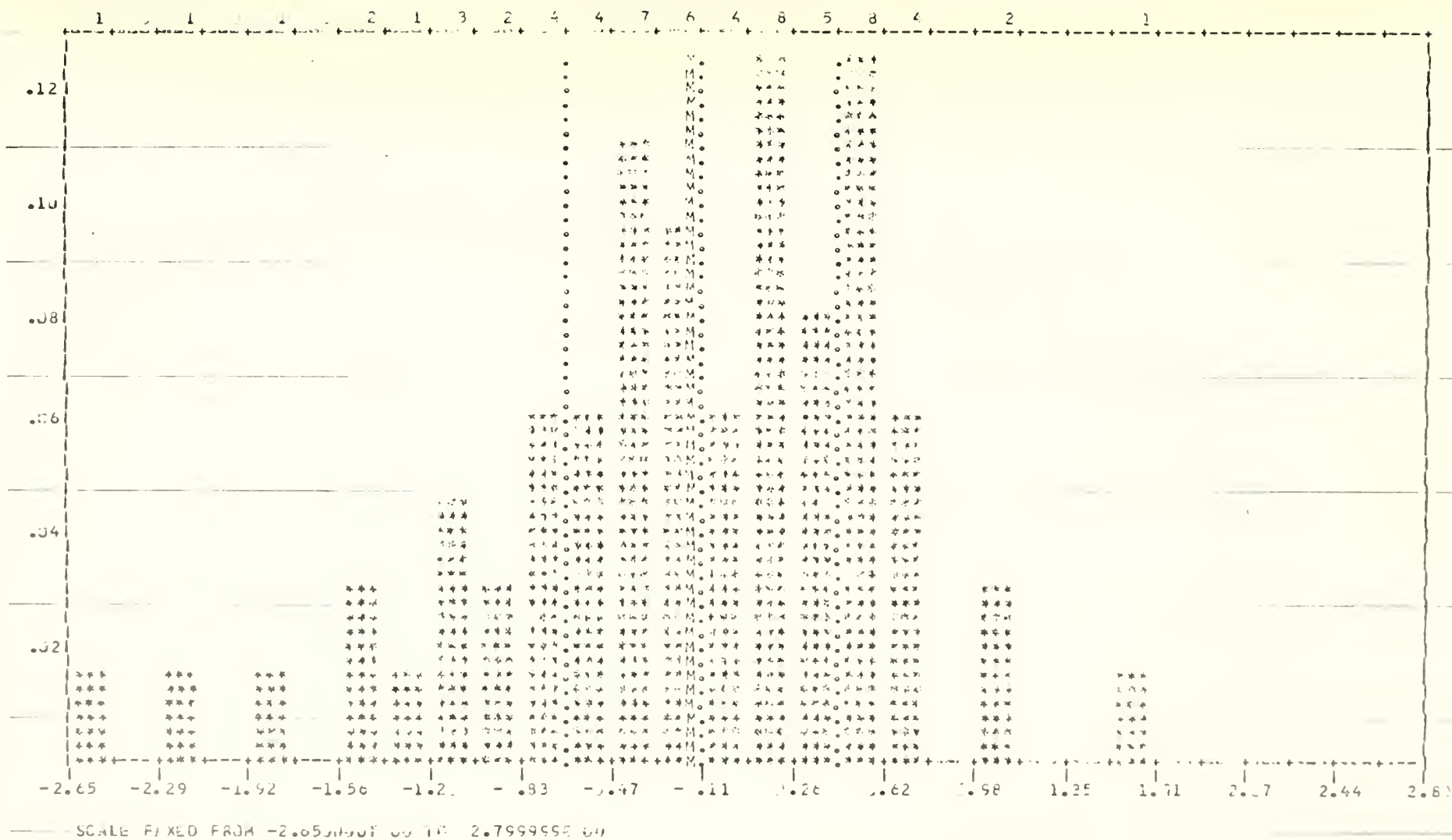


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION		
MEAN	4.993331E-01	VARIANCE	2.247666E-01	M3	1.963124E-01	MINIMUM		-1.957657E-01
MEDIAN	4.415630E-01	STD DEV	4.74 977E-02	M4	5.875735E-02	.10 QUANTILE		-9.669038E-02
TRIMEAN	4.615596E-01	SELF VAR	9.494618E-01	SKEWNESS	1.842231E 00	.25 QUANTILE (HINGE)		3.655[illegible]E-01
MIDMEAN	4.716755E-01	MEAN DEV	3.237513E-01	KURTOSIS	8.633296E 00	.50 QUANTILE (MEDIAN)		4.415630E-01
MIDRANGE	1.252397E 00	RANGE	3.486548E 00	B1	1.882643E-01	.75 QUANTILE (HINGE)		6.914711E-01
		MEDSPREAD	4.218311E-01	B2	5.612593E-01	.9 QUANTILE		1.125411E 00
						MAXIMUM		2.095472E 00

Δ_1 Errors of the FAST Model for Pay Grade E6 (High Volume Ratings Only)

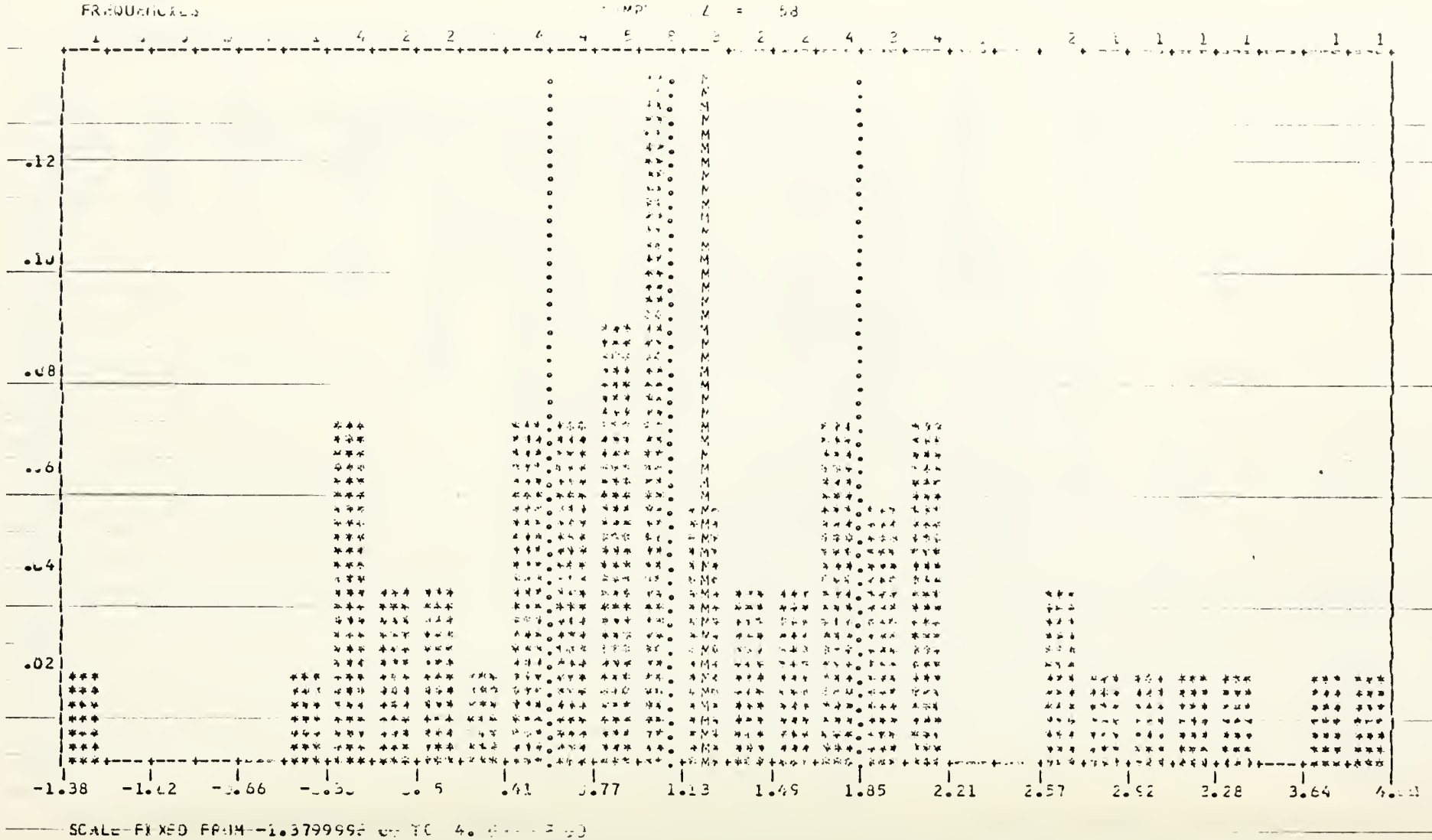


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.1373333	VARIANCE	5.02992	M3	-1.57693	MINIMUM	-1.2232461
MEDIAN	1.103175	STD DEV	7.09327	M4	1.28026	LOWER QUARTILE	2.2735179
TRIMEAN	1.1339413	COEF VAR	6.239725	SKEWNESS	-3.71647		

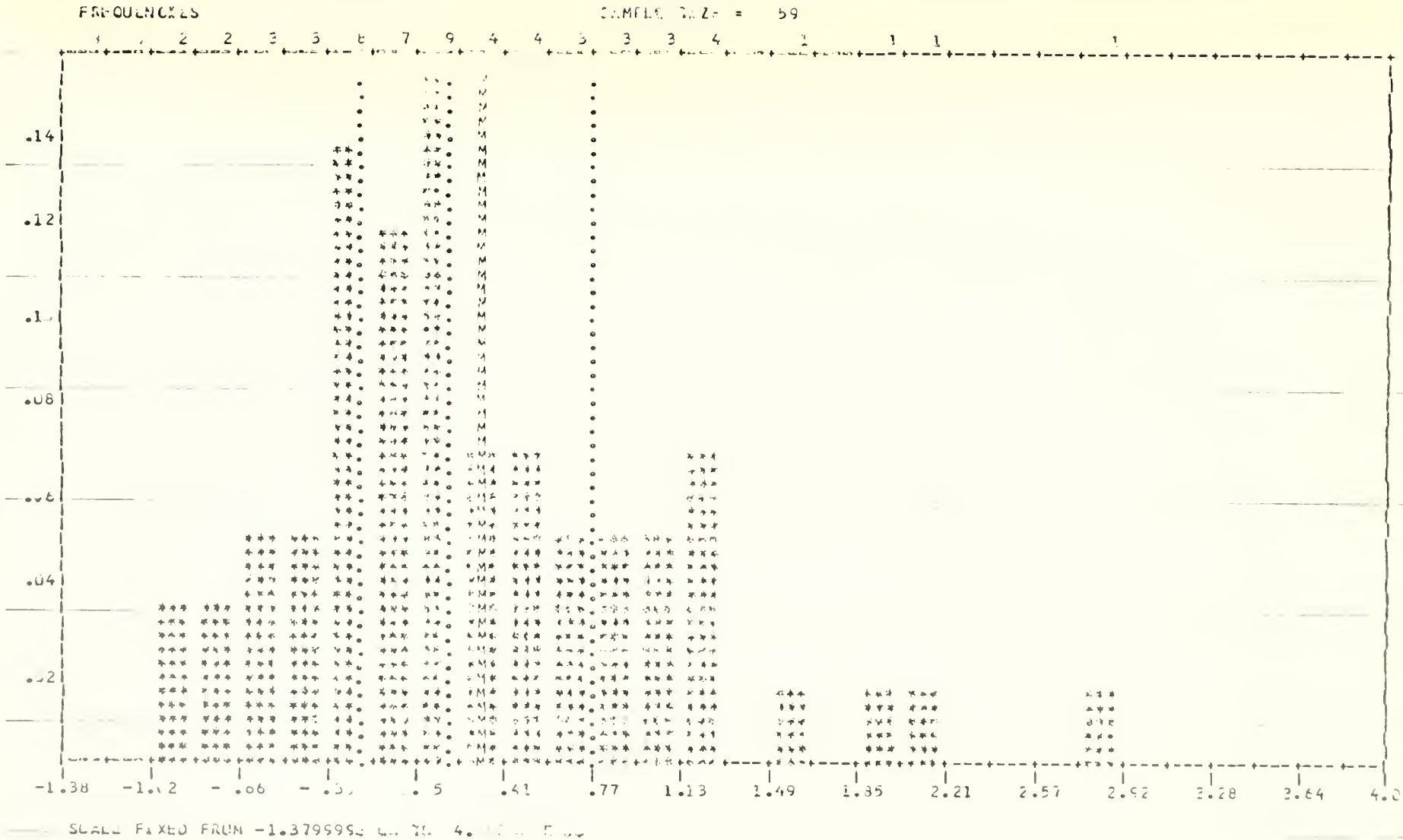


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-1.78891584-01	VARIANCE	6.152838E- 1	M3	-3.35[illegible]E-01	MINIMUM	-2.64531[illegible] 00
MEDIAN	-1.31864[illegible]E-01	STD DEV	7.84464[illegible]E-01	M4	4.42[illegible]E 00	.10 QUANTILE	-1.25[illegible]
TRIMEAN	-1.21683[illegible]- 1	COEF VAR	4.39[illegible]	SKEWNESS	-7.[illegible]- 1	.25 QUARTILE (HINGE)	-6.46[illegible]- 1
MIDMEAN	-8.87553[illegible]-02	MEAN DEV	6.[illegible]-01	KURTOSIS	7.624197 -01	.50 QUARTILE (MEDIAN)	-1.31[illegible]-01
MIDRANGE	-5.42[illegible]-01	RANGE	4.[illegible]	B[illegible]1	-3.24[illegible]- 1	.75 QUARTILE (HINGE)	4.[illegible]-01
		MID[illegible]READ	1.[illegible]	B[illegible]2	1.37[illegible]	.90 QUANTILE	[illegible]-01
						MAXIMUM	1.[illegible] 00

Δ_1 Errors of the FAST Model for Pay Grade E7 (High Volume Ratings Only)



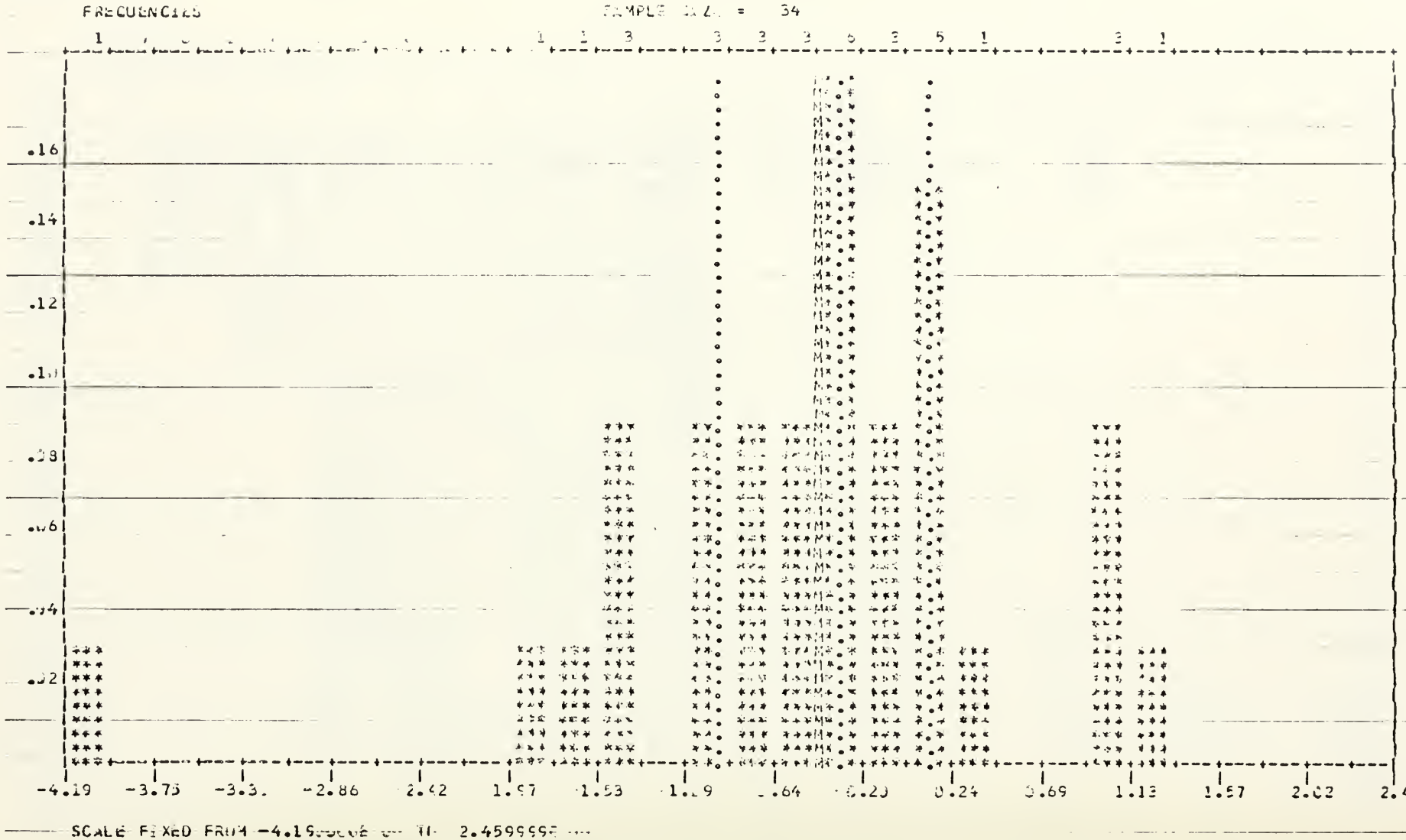
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.2347	VARIANCE	1.1562	M3	5.6	MINIMUM	-3763.7
MEDIAN	1.0664	STD DEV	1.0752	M4	4.3	Q1	-.5535

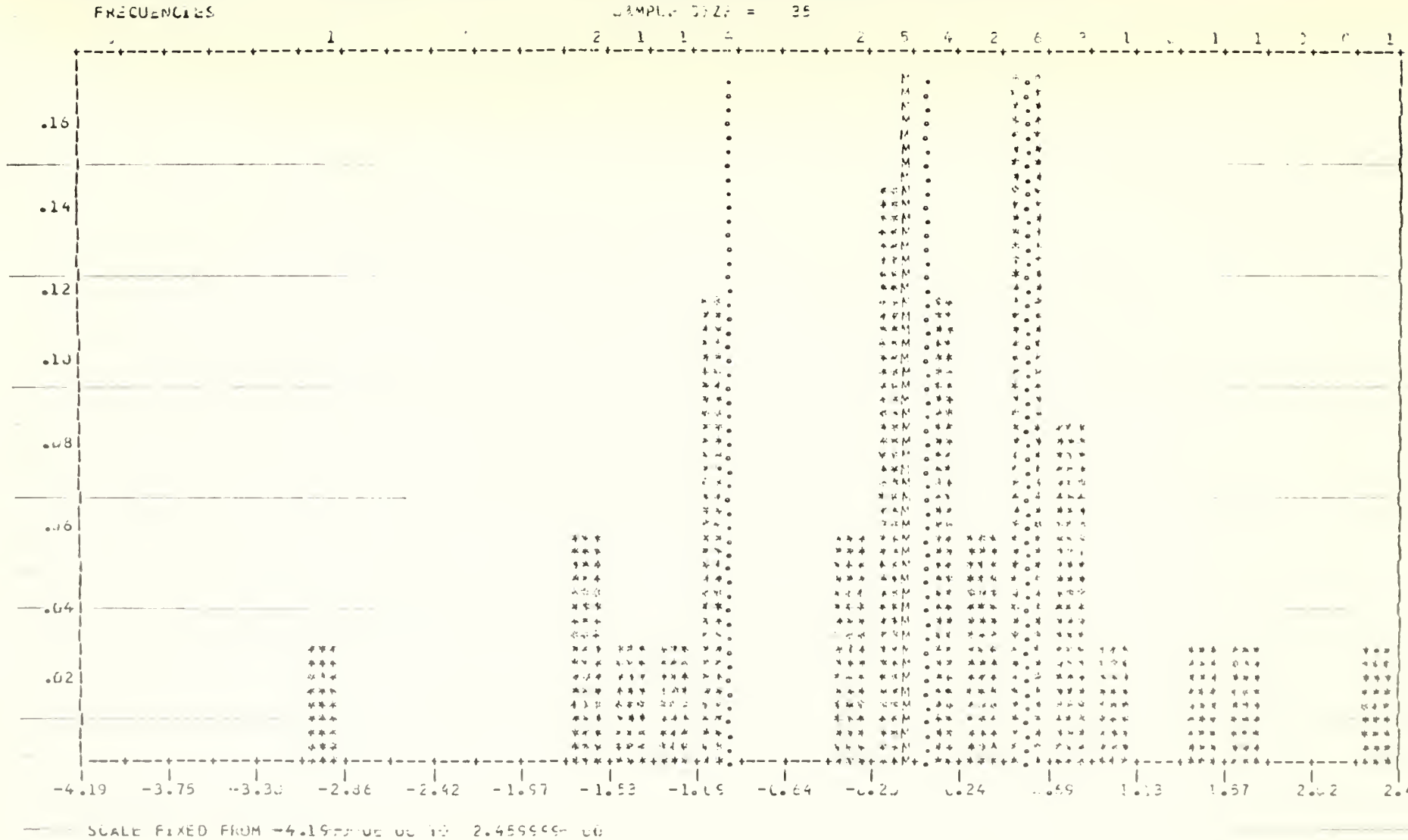


SCALE FIXED FROM -1.379995E

CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	3.019417E-01	VAR ABOUT	5.625239E-	M3	4.[illegible]E-	MINIMUM	-9.[illegible]E-01
MEDIAN	1.549[illegible]E-01	STD DEV	7.5[illegible]E-	M4	[illegible].2 4711E-	.1 QUANTILE	-6.467581E-01
TRIMEAN	2.[illegible]E-01	COEF VAR	2.[illegible]	SKEWNESS	5.[illegible]E-01	.25 QUANTILE (HINGE)	-2.147655E-01
MIDMEAN	2.[illegible]E-01	MEAN DEV	5.[illegible]	KURTOSIS	1.[illegible]E+00	.5 QUANTILE (MEDIAN)	1.[illegible]E-01
MIDRANGE	9.238349E-01	RANGE	3.675116E	M5/M1	3.8[illegible]E-1	.75 QUANTILE (HINGE)	7.[illegible]E-01
		MIDSPREAD	9.522192E-01	M6/M2	1.24[illegible]E+00	.9 QUANTILE	1.[illegible]E+00
						MAXIMUM	2.761[illegible]

Δ_1 Errors of the FAST Model for Pay Grade E8 (High Volume Ratings Only)

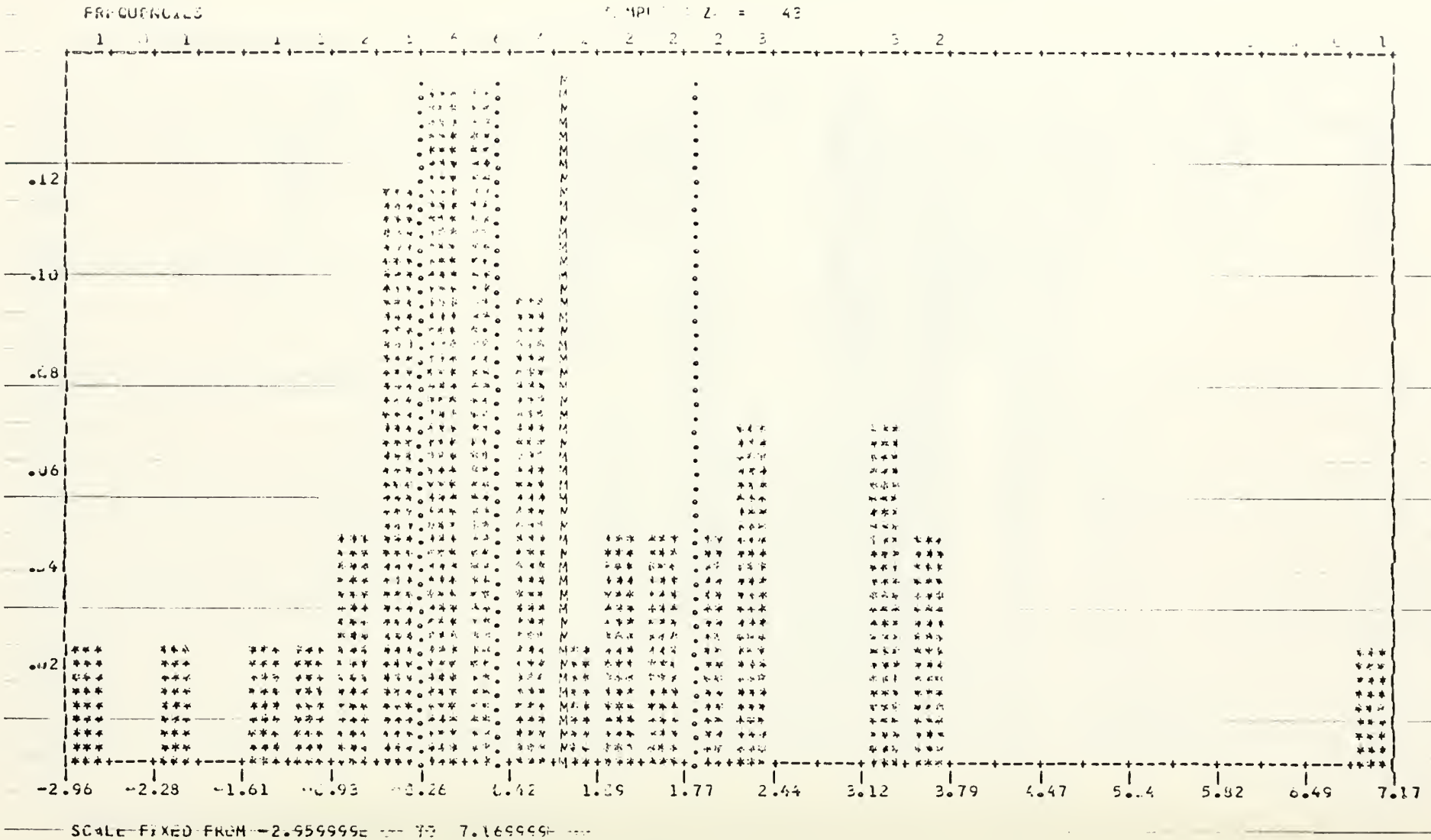


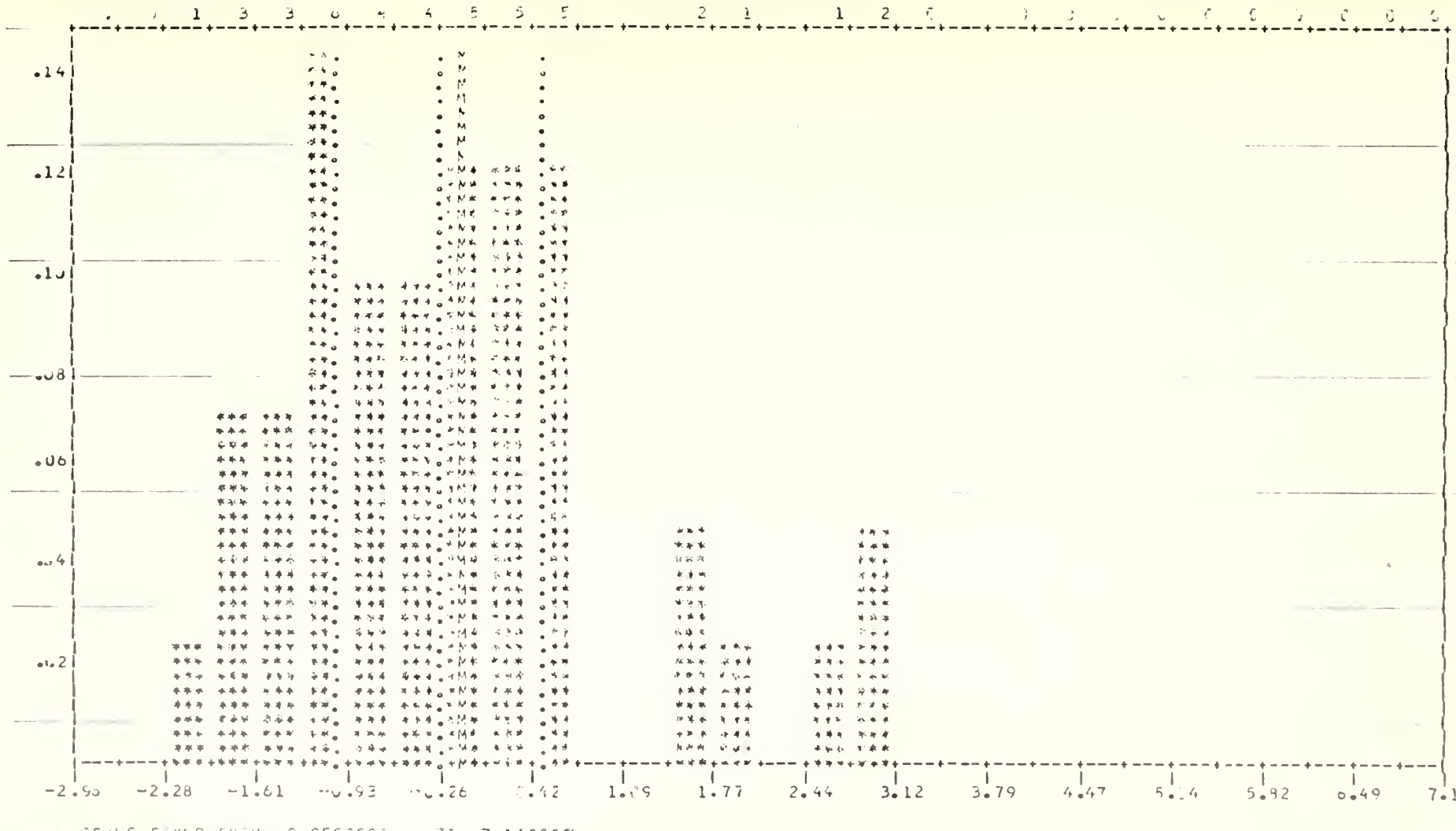


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-4.343741E-03	VARIANCE	1.779187	M3	-4.542155E-01	MINIMUM	-2.919644
MEDIAN	6.9 [illegible]	STD DEV	1.33228	M4	4.448554	.1 QUANTILE	-1.942165E-01
TRIMEAN	-3.9[illegible]	COEF VAR	2.39[illegible]	SKEWNESS	-4.[illegible]	.25 QUARTILE (FENCE)	-9.241[illegible]
MIDMEAN	1.[illegible]	MEAN DEV	7.719[illegible]	KURTOSIS	8.29 434E-01	.5 QUANTILE (MEDIAN)	6.9 918
MIDRANGE	-2.292[illegible]	RANGE	5.381[illegible]	B 1	-4.16[illegible]	.75 QUANTILE (FENCE)	6.193237E-01
		MEDIAN ABS DEV	1.[illegible]	B 2	4.131[illegible]	.9 QUANTILE	7.8 1 [illegible]
						MAXIMUM	2.461517

(C-10)

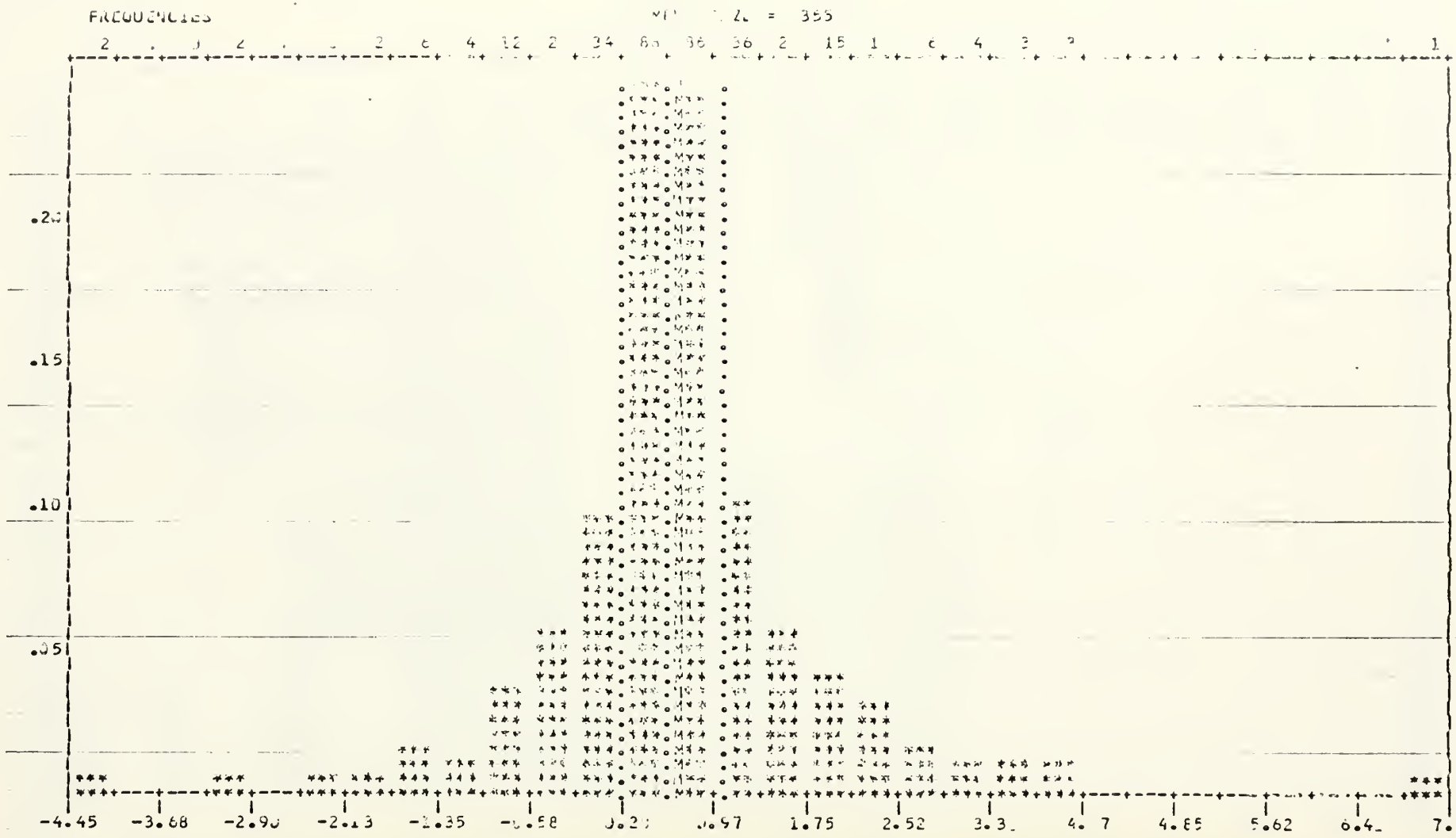
Δ_1 Errors of the FAST Model for Pay Grade E9 (High Volume Ratings Only)





CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-1.398243E-01	VARIANCE	1.564647E 00	M3	1.634636E 00	MINIMUM	-2.955555E 00
MEDIAN	-2.675663E-01	S.D. DEV	1.251855E 00	M4	7.962853E 00	.10 QUANTILE	-1.612747E 00
TRIMEAN	-2.757912E-01	COEF VAR	8.949927E 00	SK.WRONG	8.352126E-01	.25 QUANTILE (HINGE)	-1.397461E 00
MIDMEAN	-3.007868E-01	MEAN DEV	9.695157E-01	KURTOSIS	2.526471E-01	.5 QUANTILE (MEDIAN)	-2.675663E-01
MIDRANGE	4.379578E-01	RANGE	5.778857E 00	B1*M1	1.515737E 00	.75 QUANTILE (HINGE)	4.550223E-01
		MEDPK.AD	1.492493E 00	B1*M2	7.542662E 00	.9 QUANTILE	1.433388E 00
						MAXIMUM	2.777886E 00

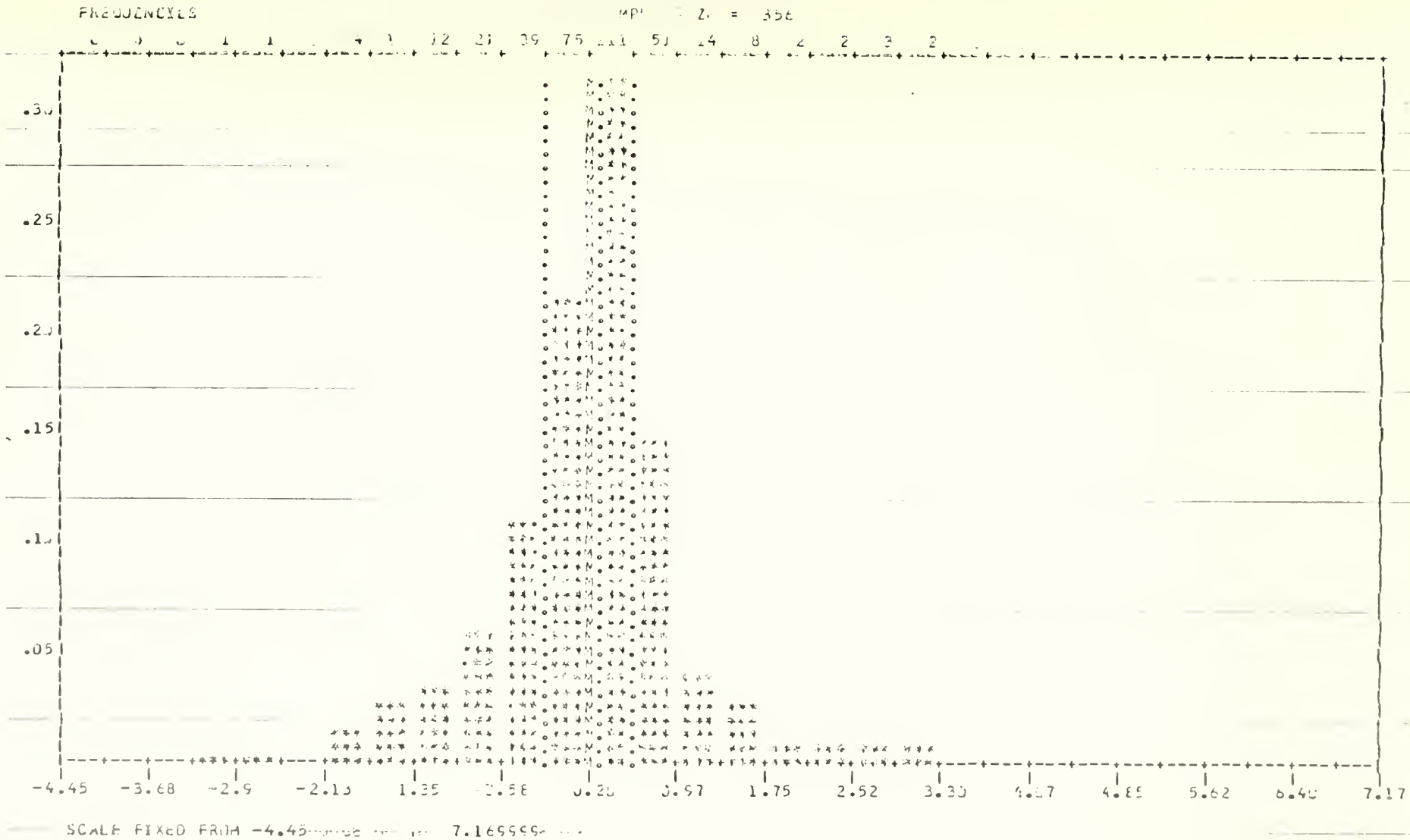
Δ_1 Errors of the FAST Model for All Pay Grades (High Volume Ratings Only)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	6.53555E-01	VARIANCE	1.21 4	M3	2.68961 [illegible] 1	MINIMUM	-4.448299E 00
MEDIAN	6.139431E-01	STD DEV	1.[illegible] 00	M4	1.327288E 01	.5% CLIP	-4.142923E 00
TRIMEAN	6.25189E-01	CLOF VAR	1.691662E 00	SKEWNESS	2.19746E-01	.25 QUARTILE (HYAGT)	2.2 5226E-01
MIDMEAN	6.15238 [illegible] 01	MEAN DEV	7.158936E-01	KURTOSIS	6.35957E 00	.5 QUARTILE (MEDIAN)	6.139431E-01
MIDRANGE	1.359528E 00	RANGE	1.616456E 01	RELATIVE [illegible]	2.456522E-01	.75 QUARTILE (HYAGT)	1.0[illegible]

Δ_1 Errors of the Advancement Model for All Pay Grades (High Volume Ratings Only)

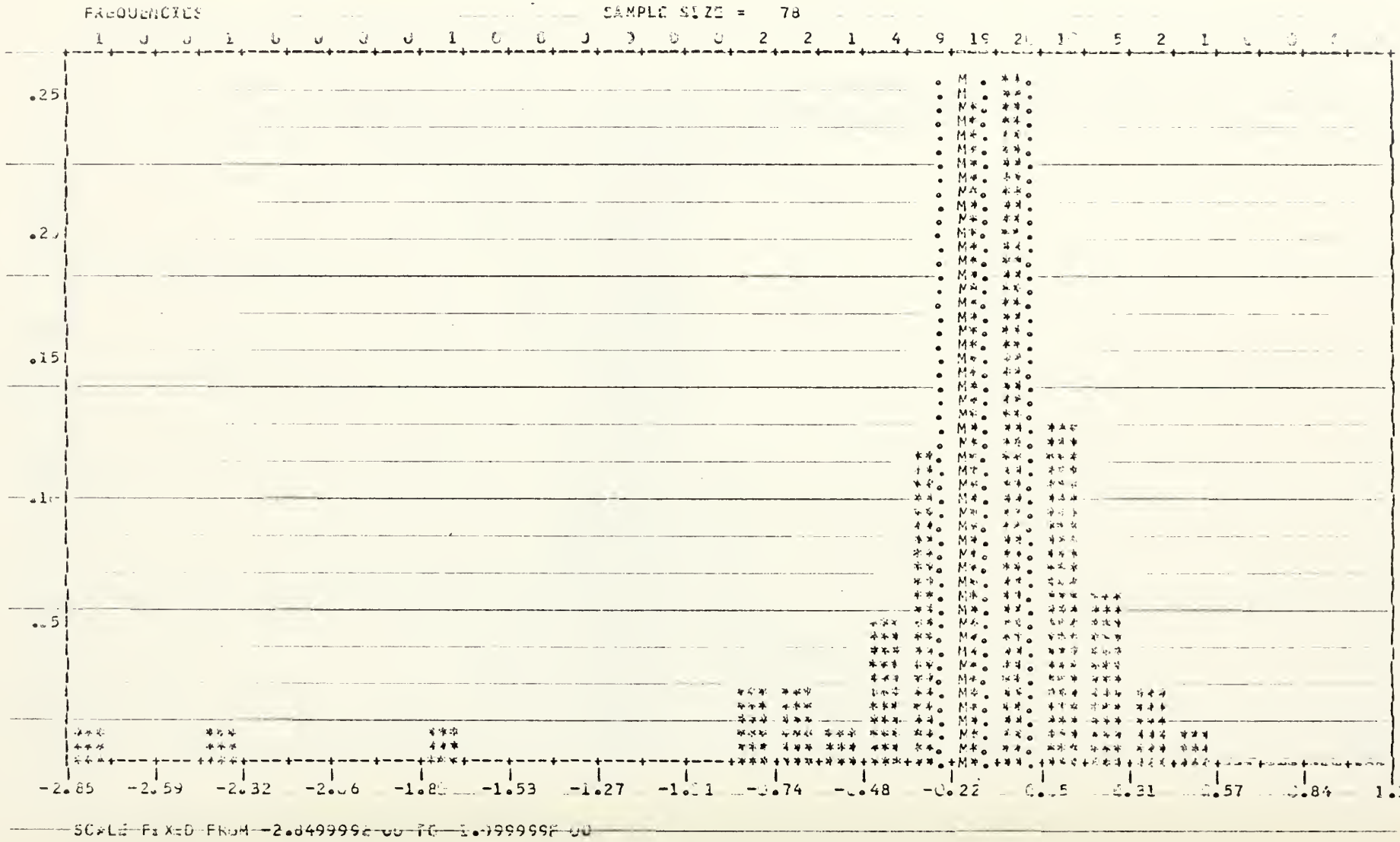
B_1 Errors of the Advancement Model for All Ply Grades (High Volume Ratings Only)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.726491E-02	VARIANCE	6.182343E-1	M3	-6.436278E-2	MIN MUM	-2.915944E
MEDIAN	2.061485E-01	STD DEV	7.862787E-1	M4	2.129381E	.1 QUANTILE	-9.243375E-01
TRIMEAN	2.280859E-01	COEF VAR	4.554199E	SKEWNESS	-1.324673E-02	.25 QUANTILE (FRACS)	-1.841955E-01
MIDMEAN	2.331519E-1	MEAN DEV	5.449736E-1	KURTOSIS	2.571187E	.5 QUANTILE (MEDIAN)	2.661 85E-1
MIDRANGE	3.776836E-02	RANGE	5.915415E	B1	-5.362235E-02	.75 QUANTILE (FRACS)	2.643196E-01
		MAD FROM L	7.078516E-1	B2	2.111871E	.9 QUANTILE	8.361 82E-1
						MAXIMUM	2.995471E

HISTOGRAMS OF Δ_2 ERRORS, HIGH VOLUME RATINGS ONLY, FAST MODEL AND ADVANCEMENT MODEL

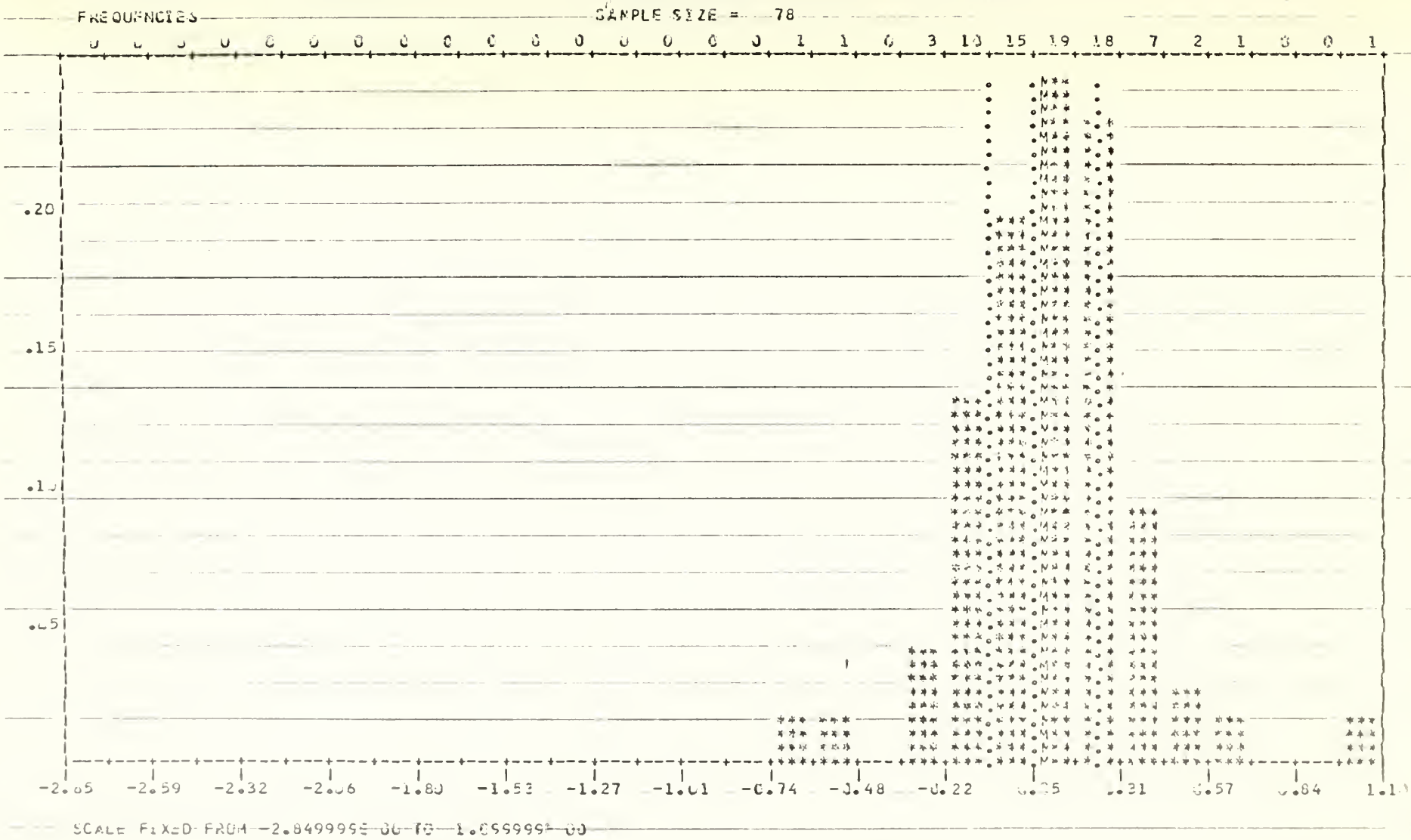
Δ_2 Errors of the FAST Model for Pay Grade E4 (High Volume Ratings Only)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-1.663231E-01	VARIANCE	2.5F3795E-01	M3	-4.475929E-01	MINIMUM	-2.8456585 00
MEDIAN	-8.85[illegible]98E-02	STD DEV	5.[illegible]35797E-01	M4	1.136750E 00	.10 QUINTILE	-6.2776 9[illegible]E-01
TRIMEAN	-9.[illegible]96885E-02	COEF VAR	2.716468E 00	SKEWNESS	-3.4682 1E 00	.25 QUINTILE (HINGE)	-2.2623[illegible]E-01
MIDMEAN	-9.0697352E-02	MEAN DEV	2.599658E-01	KURTOSIS	1.4123150 01	.50 QUINTILE (MEDIAN)	-8.85[illegible]98E-02

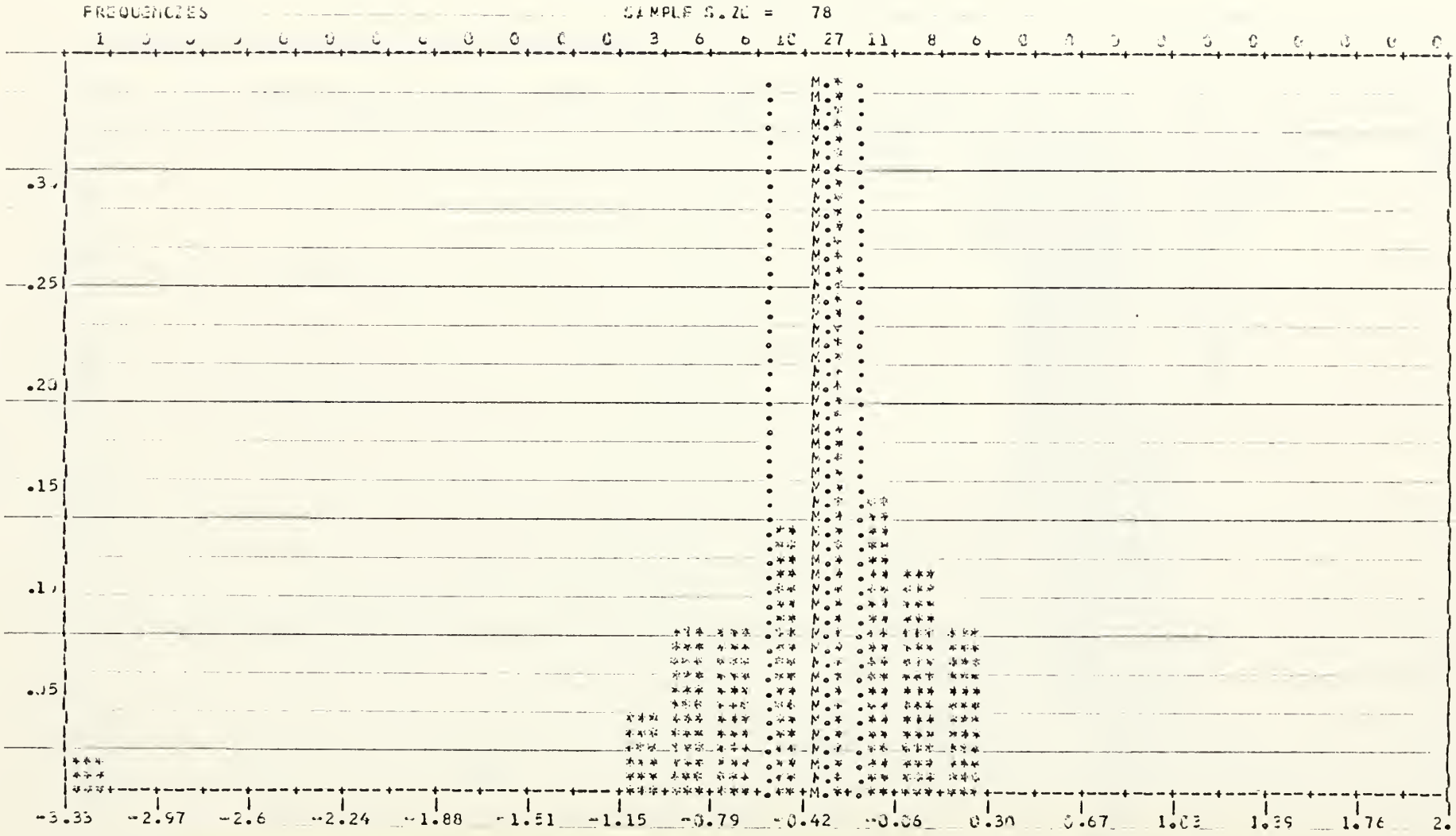
Δ_2 Errors of the Advancement Model for Pay Grade E4 (High Volume Ratings Only)

Δ_2 Errors of the Advancement Model for Pay Grade E4 (High Volume Ratings Only)



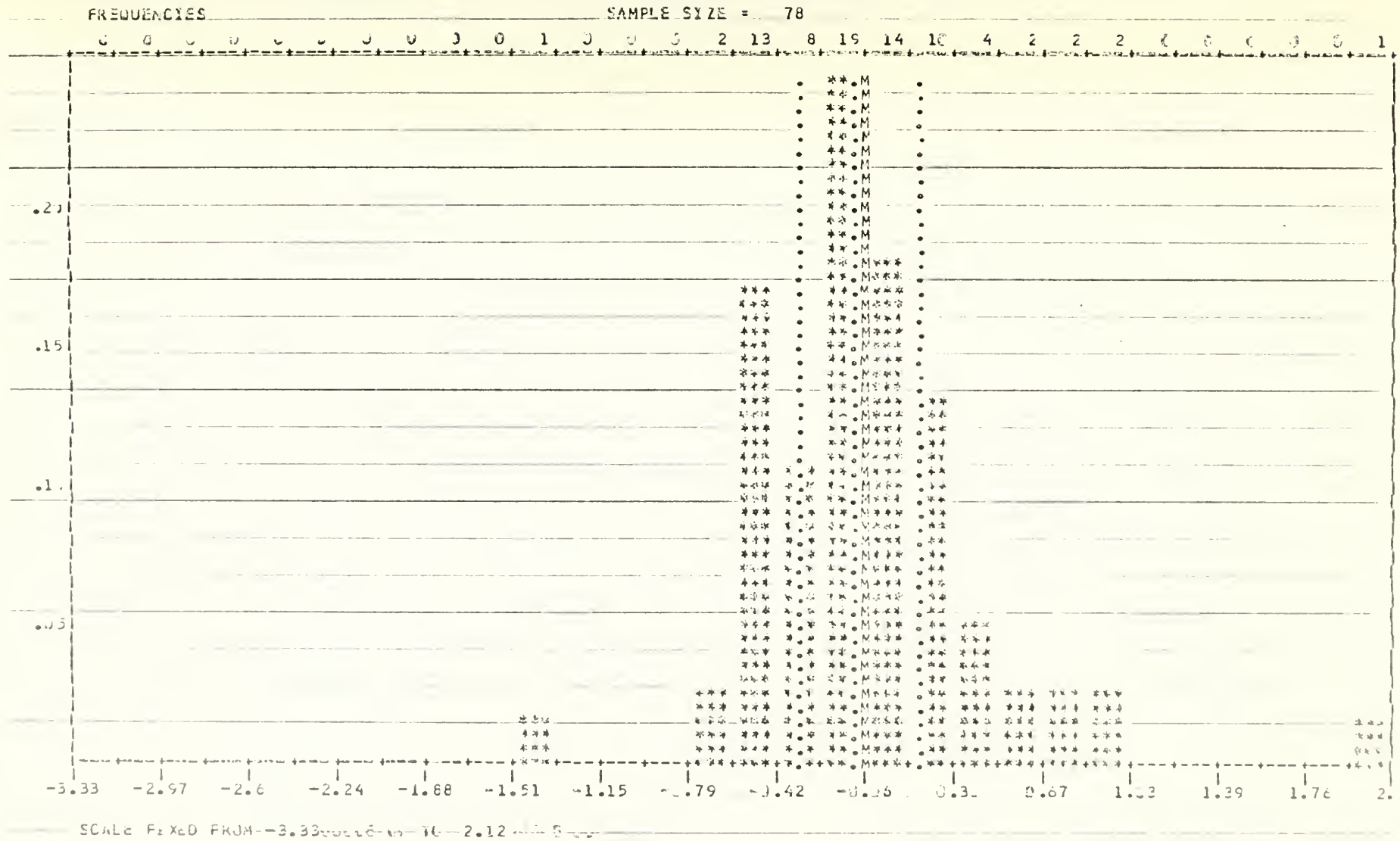
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.[illegible]375E-01	VARIANCE	6.3[illegible]7595E-02	M3	5.3662255E-03	MINIMUM	-6.6663765E-01
MEDIAN	7.4721815E-02	STD DEV	2.5101315E-01	M4	2.4428925E-02	.10 QUANTILE	-1.9615255E-01
TRIMEAN	8.3472075E-02	COEF VAR	2.5[illegible]919E[illegible]	SKEWNESS	3.3926695E-01	.25 QUANTILE (HINGE)	-6.4877515E-02
MIDRANGE	9.8453[illegible]E-02	MEAN DEV	1.8315645E-01	KURTOSIS	3.1534466E 00	.50 QUANTILE (MEDIAN)	7.4721815E-02
MIDRANGE	2.1884785E-01	RANGE	1.7665705E 00	BETA1	5.1615955E-03	.75 QUANTILE (HINGE)	2.4953222E-01
		MADSPREAD	3.1419975E-01	BETA2	2.3475885E-02	.90 QUANTILE	5.6[illegible]2233E-01
						MAXIMUM	1.1021335E 00

Δ_2 Errors of the FAST Model for Pay Grade E5 (High Volume Ratings Only)



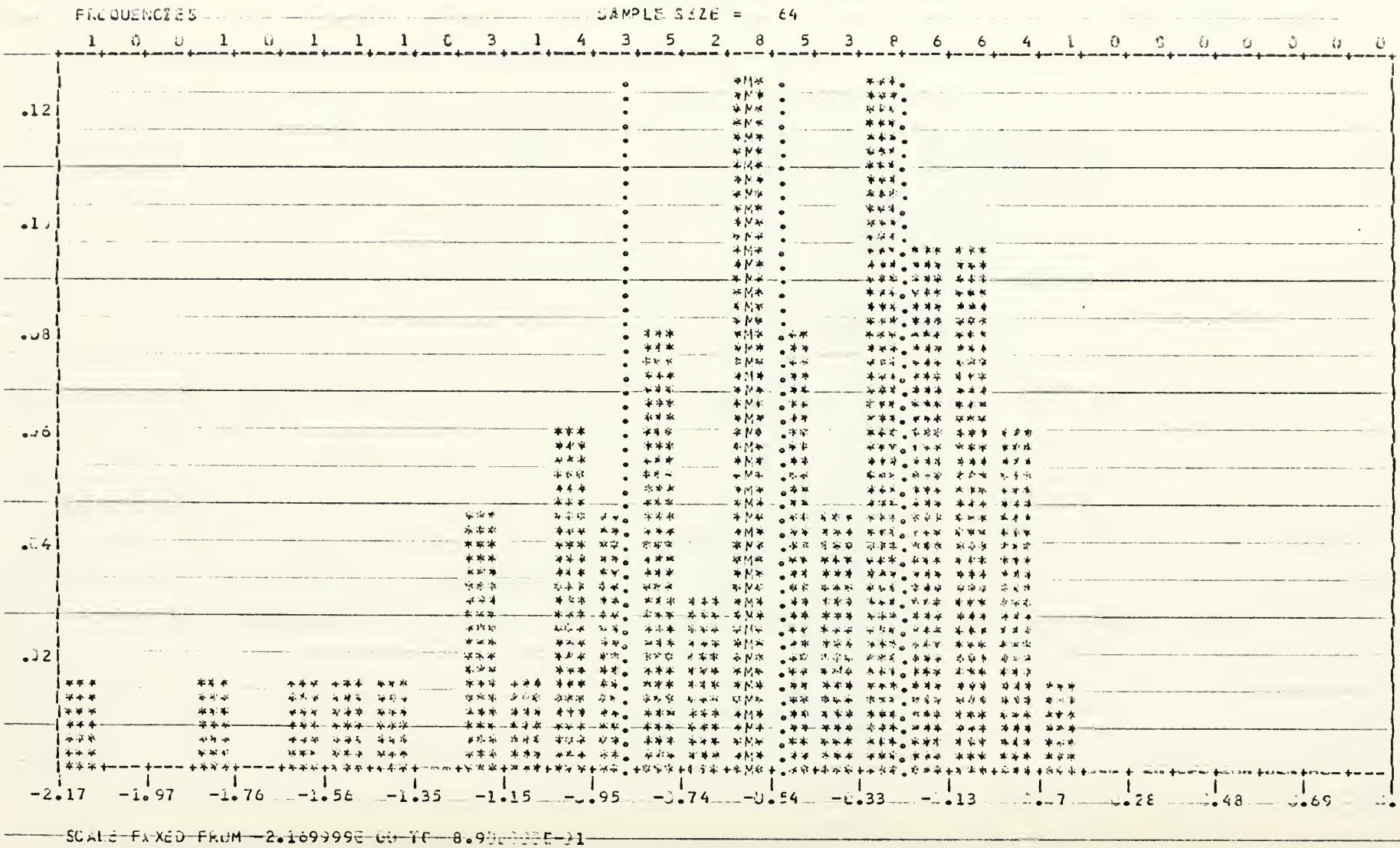
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-3.885339E-01	VARIANCE	2.124135E-01	M3	-3.346264E-01	MINIMUM	-3.326835E 00
MEDIAN	-3.338173E-01	STD DEV	4.644628E-01	M4	1.331875E-01	.1 QUANTILE	-8.822467E-01
TRIMEAN	-3.498665E-01	COEF VAR	1.195054E 00	SKEWNESS	-3.427795E 00	.25 QUANTILE (HINGE)	-5.464916E-01
MIDMEAN	-3.400718E-01	MEAN DEV	2.747633E-01	KURTOSIS	1.995619E 01	.5 QUANTILE (MEDIAN)	-3.338173E-01

Δ_2 Errors of the Advancement Model for Pay Grade E5 (High Volume Ratings Only)



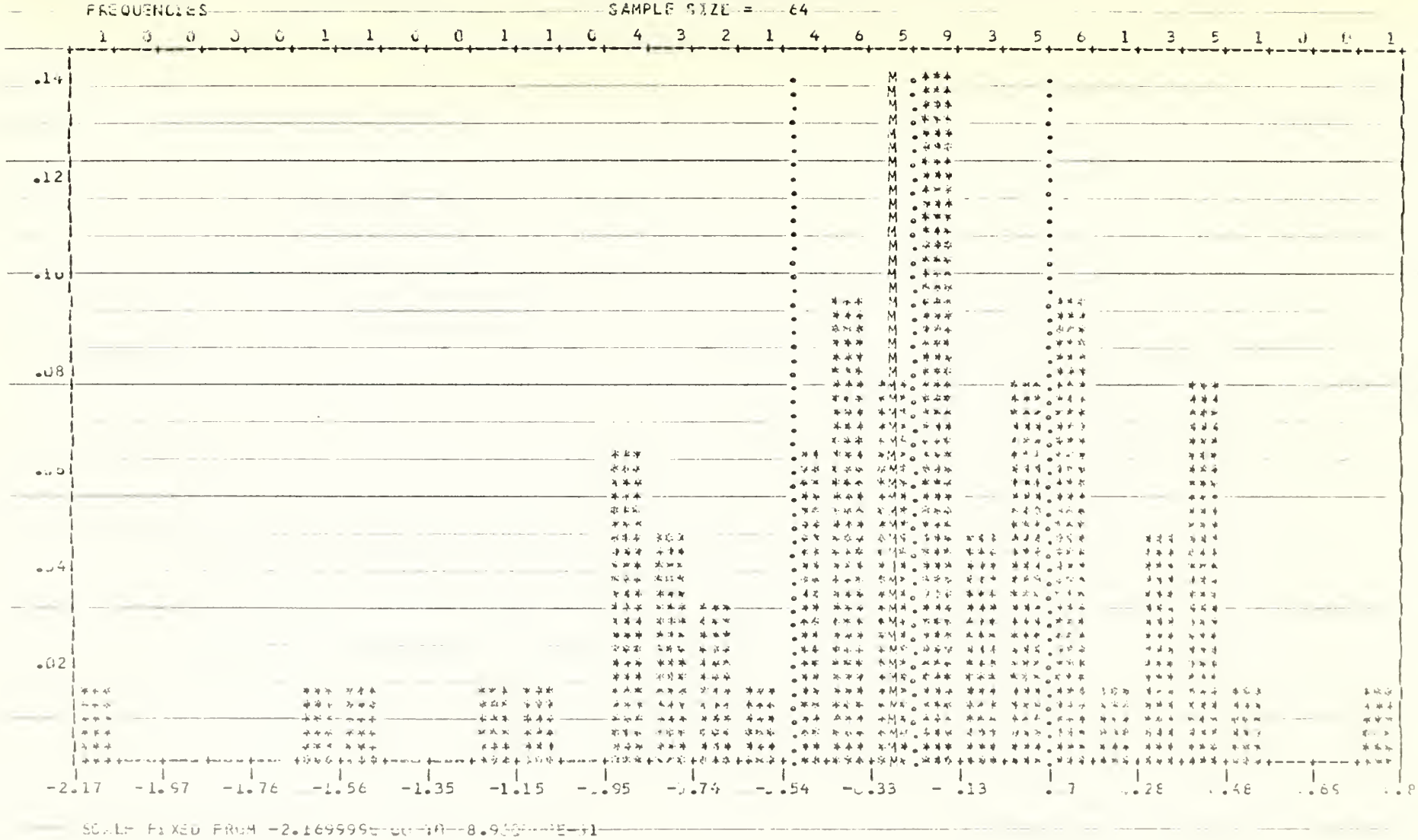
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-4.867778E-02	VARIANCE	2.183676E-01	M3	1.365513E-01	MINIMUM	-1.337231E+00
MEDIAN	-8.384795E-02	S.D. DEV	4.672473E-1	M4	3.917977E-01	.1 QUANTILE	-4.922254E-01
TRIMEAN	-7.886552E-02	COEF VAR	9.377435E 00	SKEWNESS	1.442283E 00	.25 QUANTILE (HINGE)	-3.086348E-01
MIDMEAN	-6.869728E-02	MEAN DEV	3.211419E-01	KURTOSIS	6.624747E 00	.5 QUANTILE (MEDIAN)	-8.384795E-02
MIDRANGE	3.8966 2E-01	RANGE	3.454161E	BETA1	1.317675E-01	.75 QUANTILE (HINGE)	1.615866E-01
		MEDSPREAD	4.702215E-01	BETA2	3.749851E-01	.9 QUANTILE	3.297281E-01
						MAXIMUM	2.116955E 00

Δ_2 Errors of the FAST Model for Pay Grade E6 (High Volume Ratings Only)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-5.823511E-01	VARIANCE	2.323854E-01	M3	-1.147969E-01	MINIMUM	-2.173992E 00
MEDIAN	-5.219092E-01	STD DEV	4.821678E-01	M4	2.115858E-01	.1 QUANTILE	-1.211773E 00
TRIMEAN	-5.360851E-01	COEF VAR	8.277555E-01	SKEWNESS	-1.024721E 00	.25 QUANTILE (LYNGE)	-8.724136E-01
MIDMEAN	-5.018679E-01	MEAN DEV	3.746851E-01	KURTOSIS	9.081506E-01	.50 QUANTILE (MEDIAN)	-5.219092E-01
MIDRANGE	-1.086788E 00	RANGE	2.211166E 00			.75 QUANTILE	-2.332454E-01

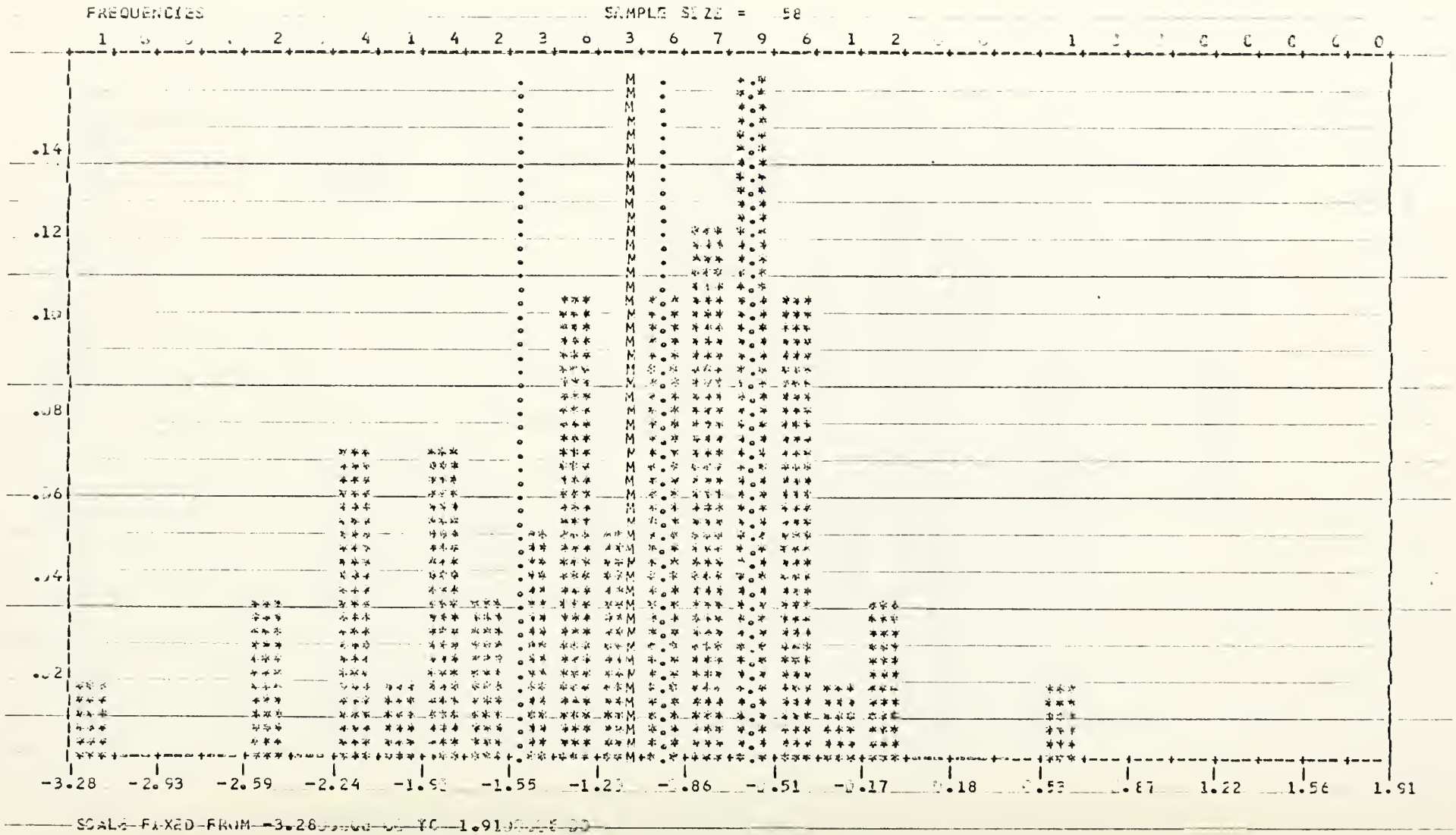
Δ_2 Errors of the Advancement Model for Pay Grade E6 (High Volume Ratings Only)

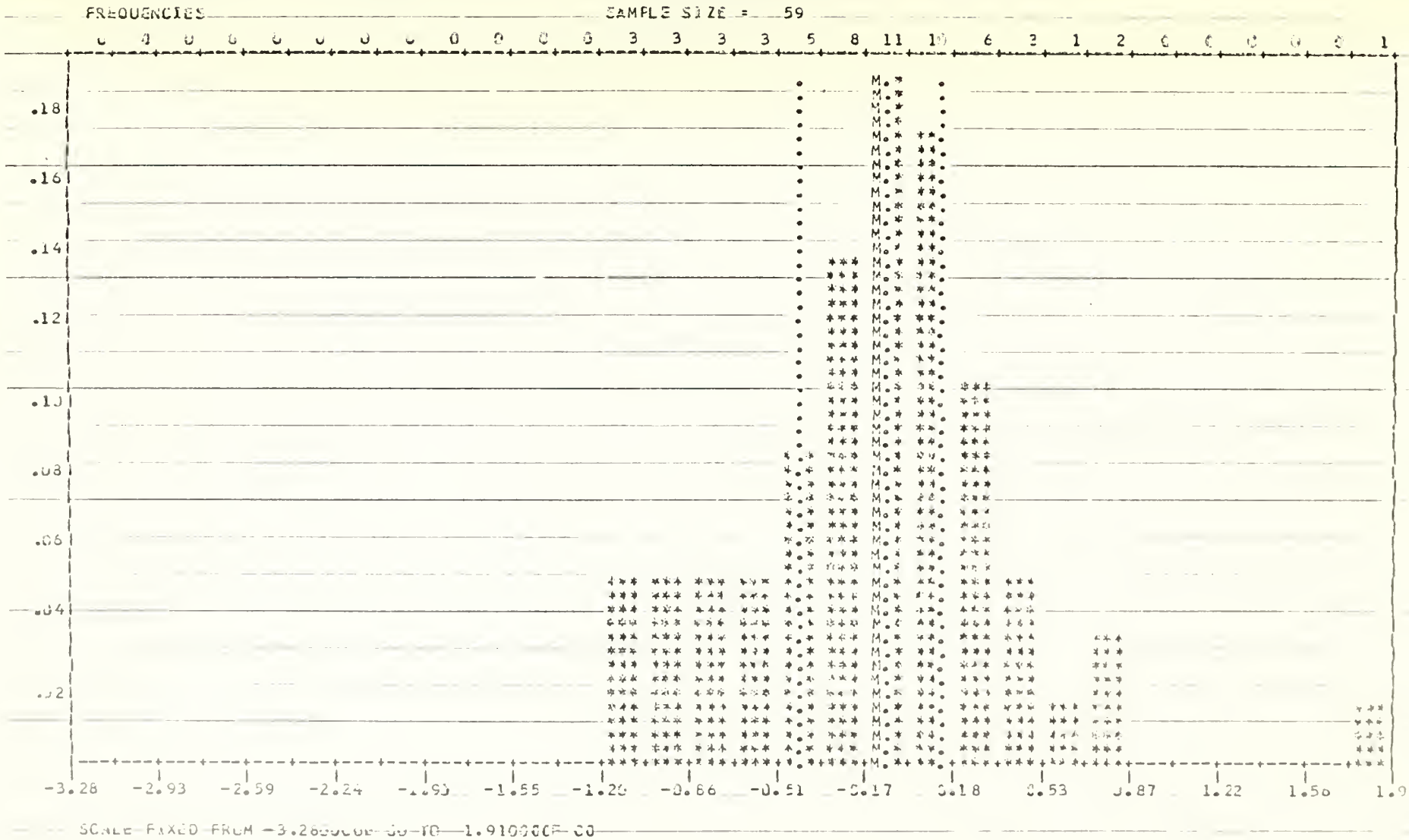


9-H

CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-2.718101E-01	VARIANCE	2.998128E-01	M3	-1.455047E-01	MINIMUM	-2.162552E-00
MEDIAN	-2.175913E-01	STD DEV	5.475516E-01	M4	3.976766E-01	.10 QUANTILE	-9.151 96E-01
TRIMEAN	-2.156193E-01	COEF VAR	2. 1442 E	SKEWNESS	-8.863429E-01	.25 QUANTILE (FENGE)	-5.761295E-01
MIDMEAN	-2.087 82E-01	MEAN DEV	4.049742E-01	KURTOSIS	1.417475E 00	.5, QUANTILE (MEDIAN)	-2.175913E-01
MIDRANGE	-6.345[illegible]E-01	RANGE	3. 56 4E	BETA1	-1.387552E-01	.75 QUANTILE (HINGE)	7.883459E 2
		MIDSPREAD	5.849628E 01	BETA2	3.804941E-01	.90 QUANTILE	3.514814E-01
						MAXIMUM	8.934517E-01

Δ_2 Errors of the FAST Model for Pay Grade E7 (High Volume Ratings Only)

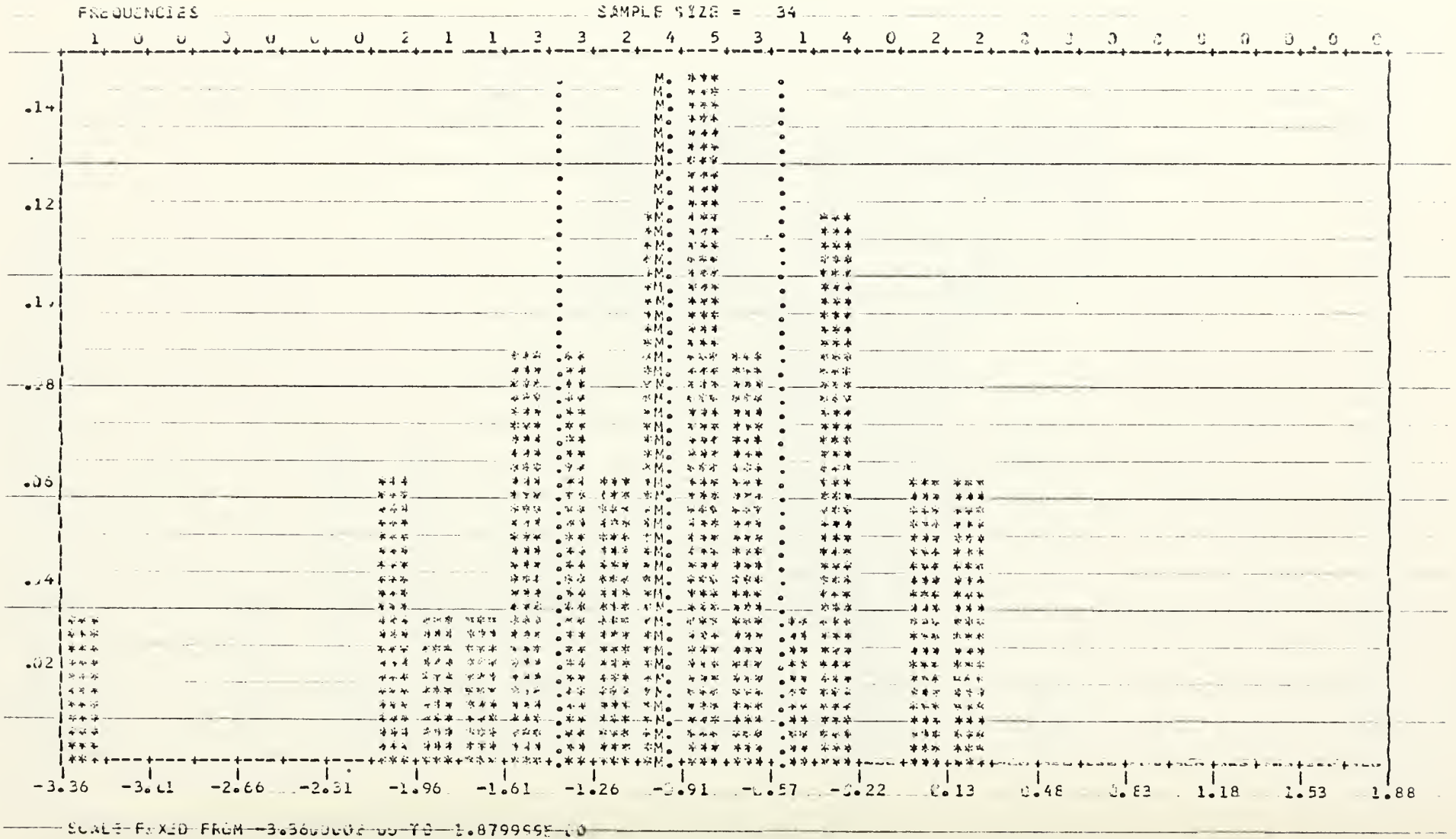




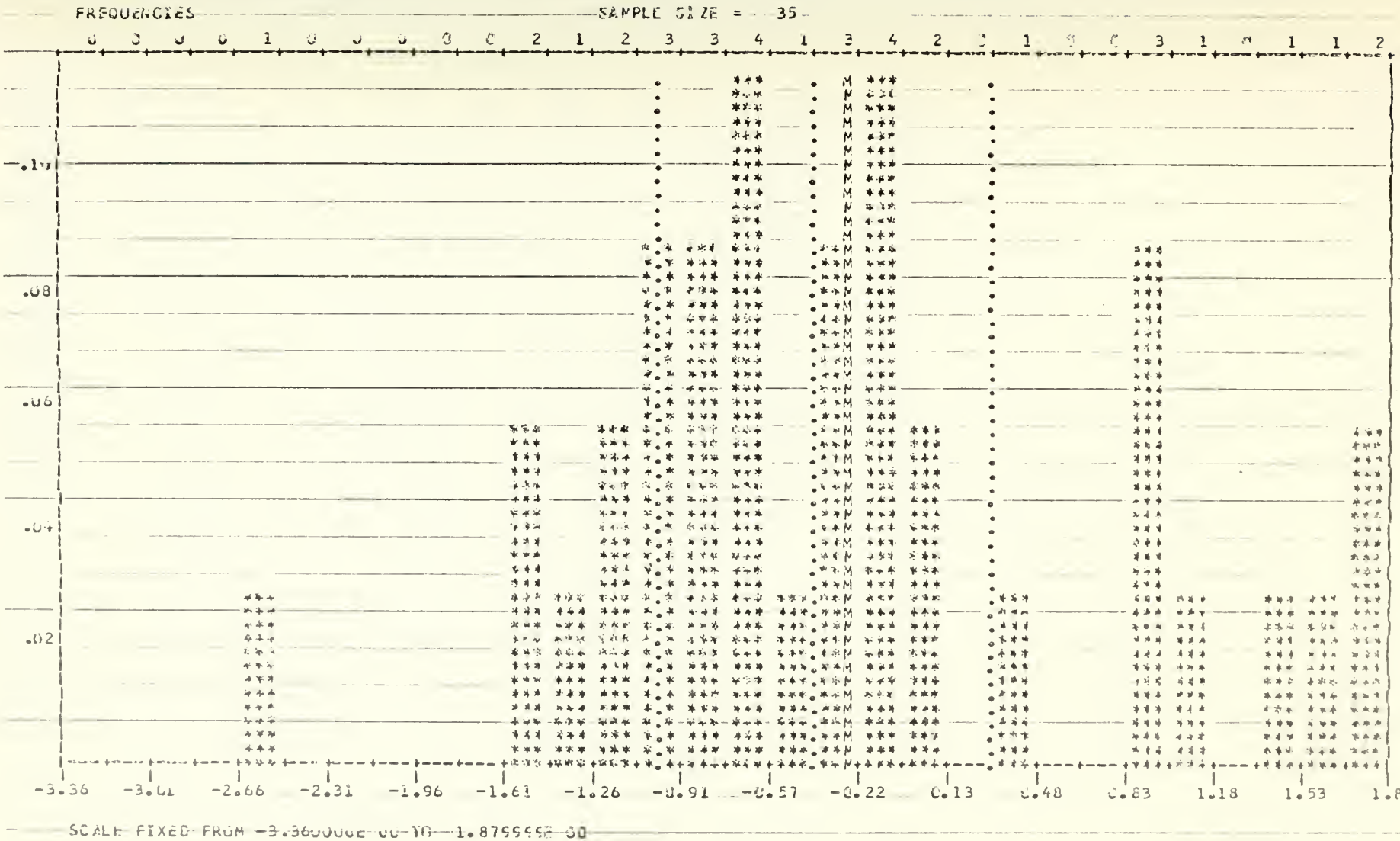
H-8

CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-1.183792E-01	VARIANCE	2.744943E-1	M3	9.739536E-2	MINIMUM	-1.179766E 00
MEDIAN	-8.441357E-02	STD DEV	5.238222E-01	M4	4.229151E-01	.10 QUANTILE	-8.772297E-01
TRIMEAN	-9.760608E-02	COEF VAR	4.425795E 00	SKEWNESS	6.772335E-1	.25 QUANTILE (HINGE)	-4.254913E-1
MIDMEAN	-9.859141E-2	MEAN DEV	3.829454E-1	KURTOSIS	2.626161E 00	.5 QUANTILE (MEDIAN)	-8.441357E-02
MIDRANGE	3.655767E-01	RANGE	3.090685E 00	BETA1	9.249502E-02	.75 QUANTILE (HINGE)	1.662931E-01
		MEDSPREAD	5.917845E-1	BETA2	4.026511E-01	.9 QUANTILE	4.271 45E-1
						MAXIMUM	1.910919E 00

Δ_2 Errors of the FAST Model for Pay Grade E8 (High Volume Ratings Only)

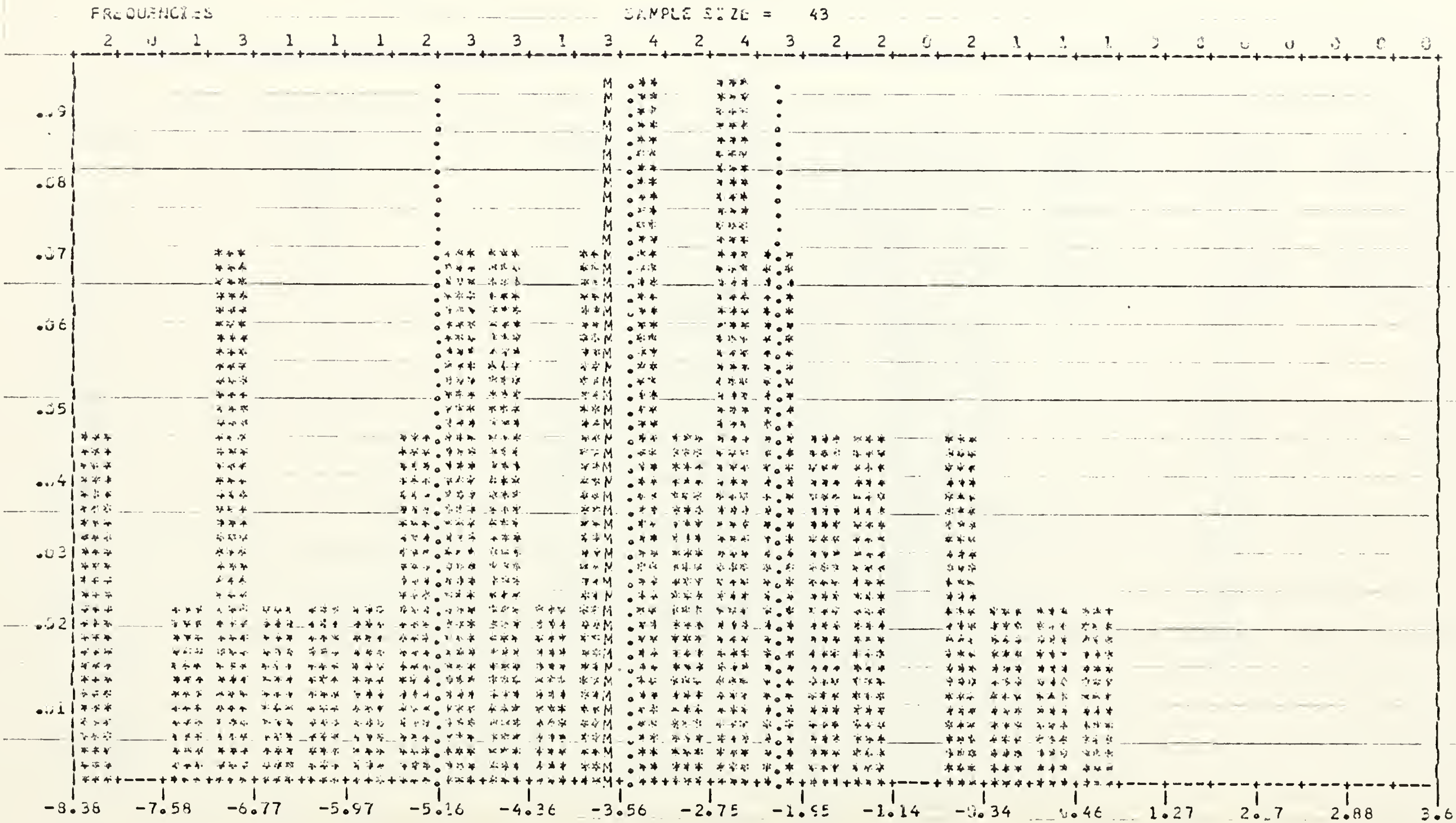


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-9.942143E-01	VARIANCE	5.489966E-01	M3	-3.448713E-01	MINIMUM	-3.358387E 00
MEDIAN	-9.537125E-01	STD DEV	7.409431E-01	M4	1.367254E 00	.10 QUANTILE	-2.699775E 00
TRIMEAN	-9.543936E-01	COEF VAR	7.452549E-01	SKEWNESS	-8.478178E-01	.25 QUANTILE (HINGE)	-1.256462E 00
MIDMEAN	-9.529271E-01	MEAN DEV	5.819246E-01	KURTOSIS	1.634518E 00	.50 QUANTILE (MEDIAN)	-9.537125E-01



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-2.378452E-01	VARIANCE	1.612725E 00	M3	4.164796E-01	MINIMUM	-2.579619E 00
MEDIAN	-3.710175E-01	STD DEV	1.269818E 00	M4	3.107458E 00	.10 QUANTILE	-1.476760E 00
TRIMEAN	-3.495832E-01	COEF VAR	4.338139E 00	SKEWNESS	3.858743E-01	.25 QUANTILE (HINGE)	-9.918356E-01
MIDMEAN	-3.961160E-01	MEAN DEV	7.878667E-01	KURTOSIS	-2.499965E-01	.5 QUANTILE (MEDIAN)	-3.710175E-01
MIDRANGE	-3.604424E-01	RANGE	4.458753E 00	BETA1	3.813572E-01	.75 QUANTILE (HINGE)	3.875378E-01
		MIDSPREAD	1.329373E 00	BETA2	2.937265E 00	.90 QUANTILE	1.174 23E 00
						MAXIMUM	1.879934E 00

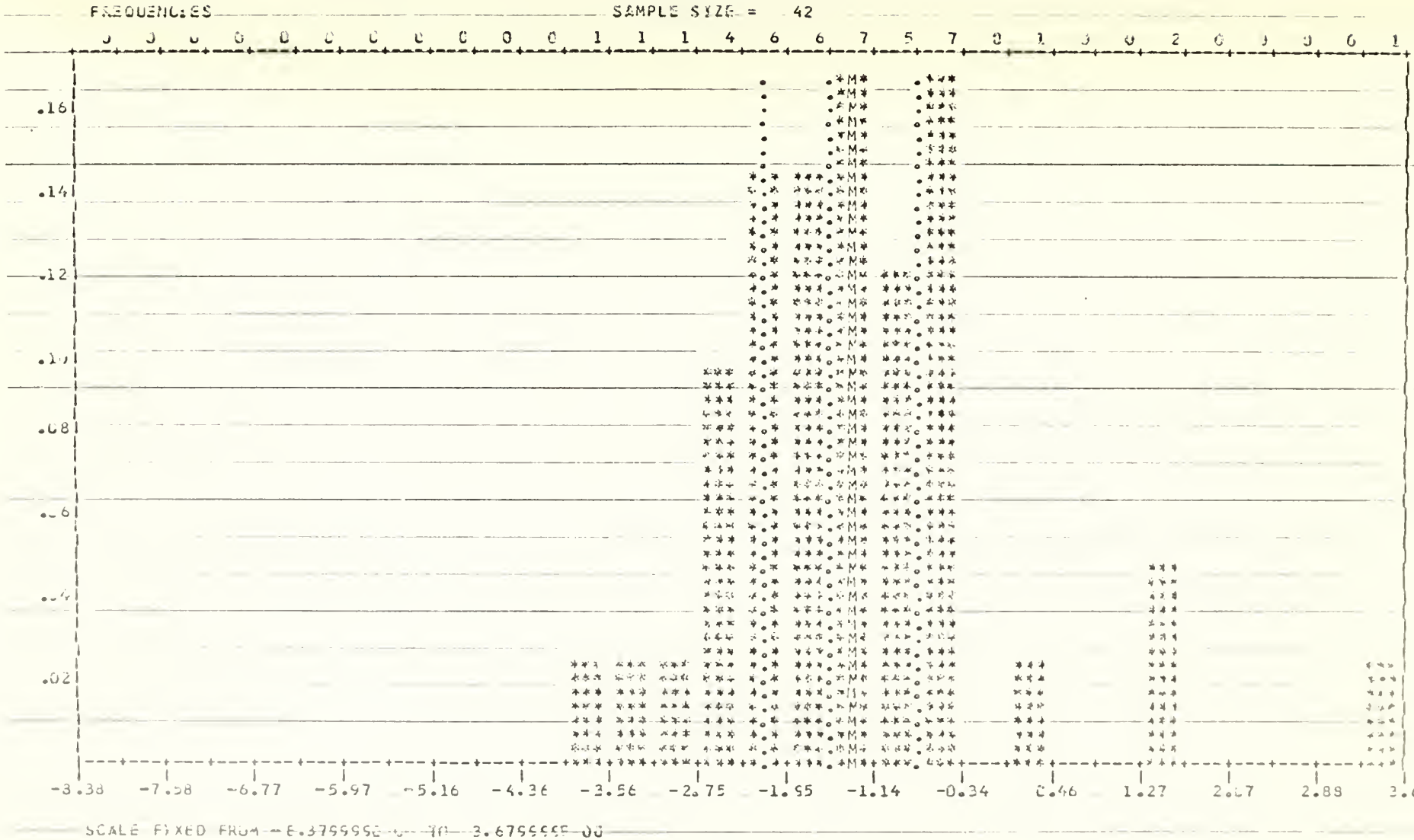
Δ_2 Errors of the FAST Model for Pay Grade E9 (High Volume Ratings Only)



SCALE FIXED FROM -8.379999E 00 TO 3.679999E 00

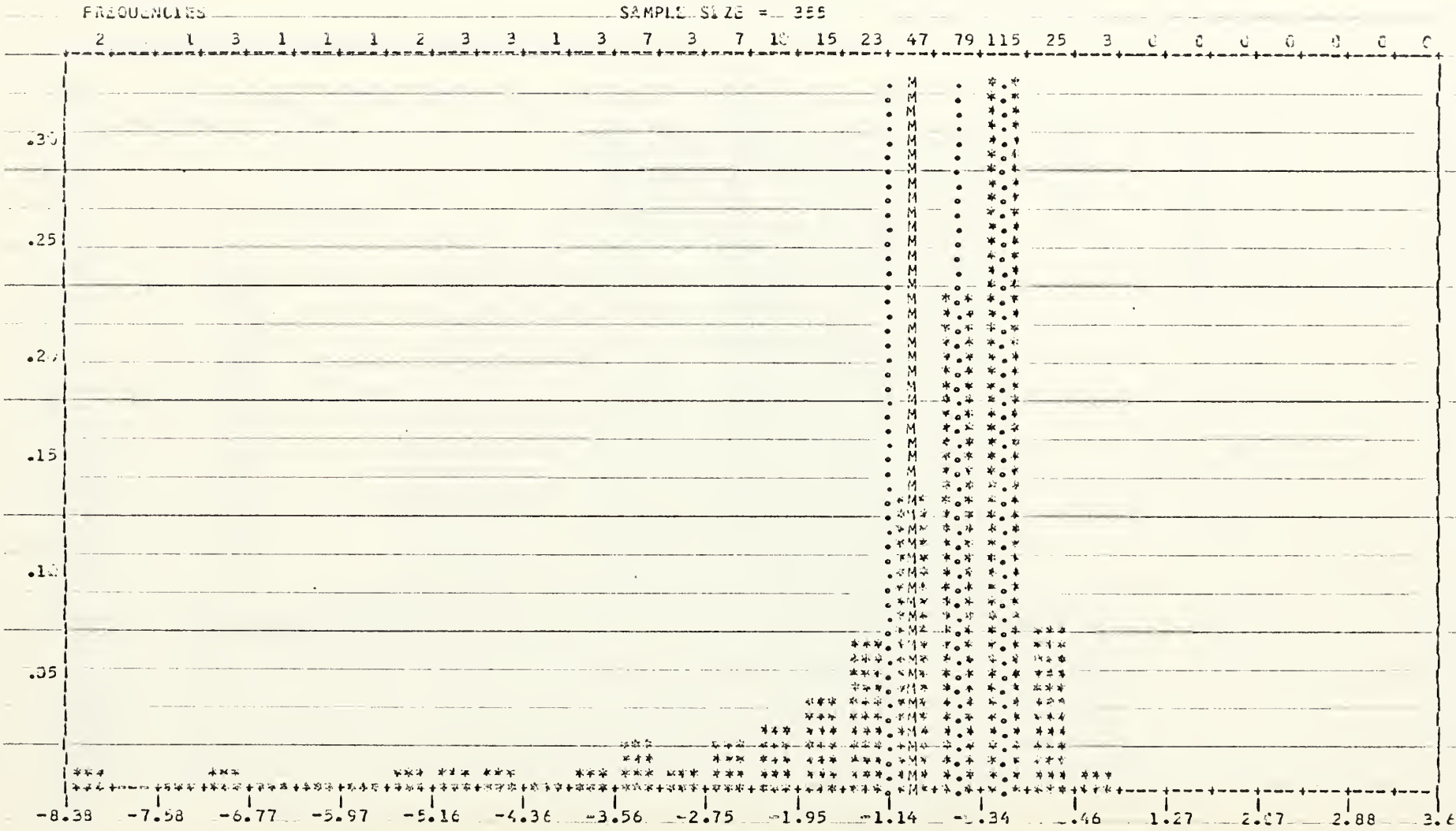
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-3.711781E 00	VARIANCE	5.2[illegible]6 4E 00	M3	-2.69[illegible]84E 00	MINIMUM	-8.384521E 00
MEDIAN	-3.488311E 00	STD DEV	2.280489E 00	M4	6.164862E 01	.10 QUANTILE	-7.[illegible]61324E 00
TRIMEAN	-3.573416E 00	COEF VAR	6.143976E-01	SKEWNESS	-1.744[illegible]6E-01	.25 QUANTILE (HINGE)	-5.177398E 00
MIDMEAN	-3.593858E 00	MEAN DEV	1.837685E 00	KURTOSIS	-7.262495E-01	.50 QUANTILE (MEDIAN)	-3.488311E 00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.75 QUANTILE [illegible]	[illegible]

Δ_2 Errors of the Advancement Model for Pay Grade E9 (High Volume Ratings Only)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION		
MEAN	-1.2549918 00	VARIANCE	1.7436158 00	M3	3.5668158 00	MINIMUM		-8.3799998 00
MEDIAN	-1.4960942 00	STD DEV	1.3245688 00	M4	2.0991668 01	.10 QUANTILE		-2.5003688 00
TRIMEAN	-1.4437488 00	COEF VAR	1.0196638 00	SKEWNESS	1.5492178 00	.25 QUANTILE	(HINGE)	-2.1748878 00
MIDMEAN	-1.4594168 00	MEAN DEV	9.8141488-01	KURTOSIS	3.9 48948 00	.50 QUANTILE	(MEDIAN)	-1.496 942 00
MIDRANGE	3.0948162 00	RANGE	7.2978858 00	BETA1	3.3160898 00	.75 QUANTILE	(HINGE)	-6.7812038-01
		MIDSPREAD	1.4267748 00	BETA2	1.9412818 01	.90 QUANTILE		-4.2 2461 - 1
						MAXIMUM		3.6799918 00

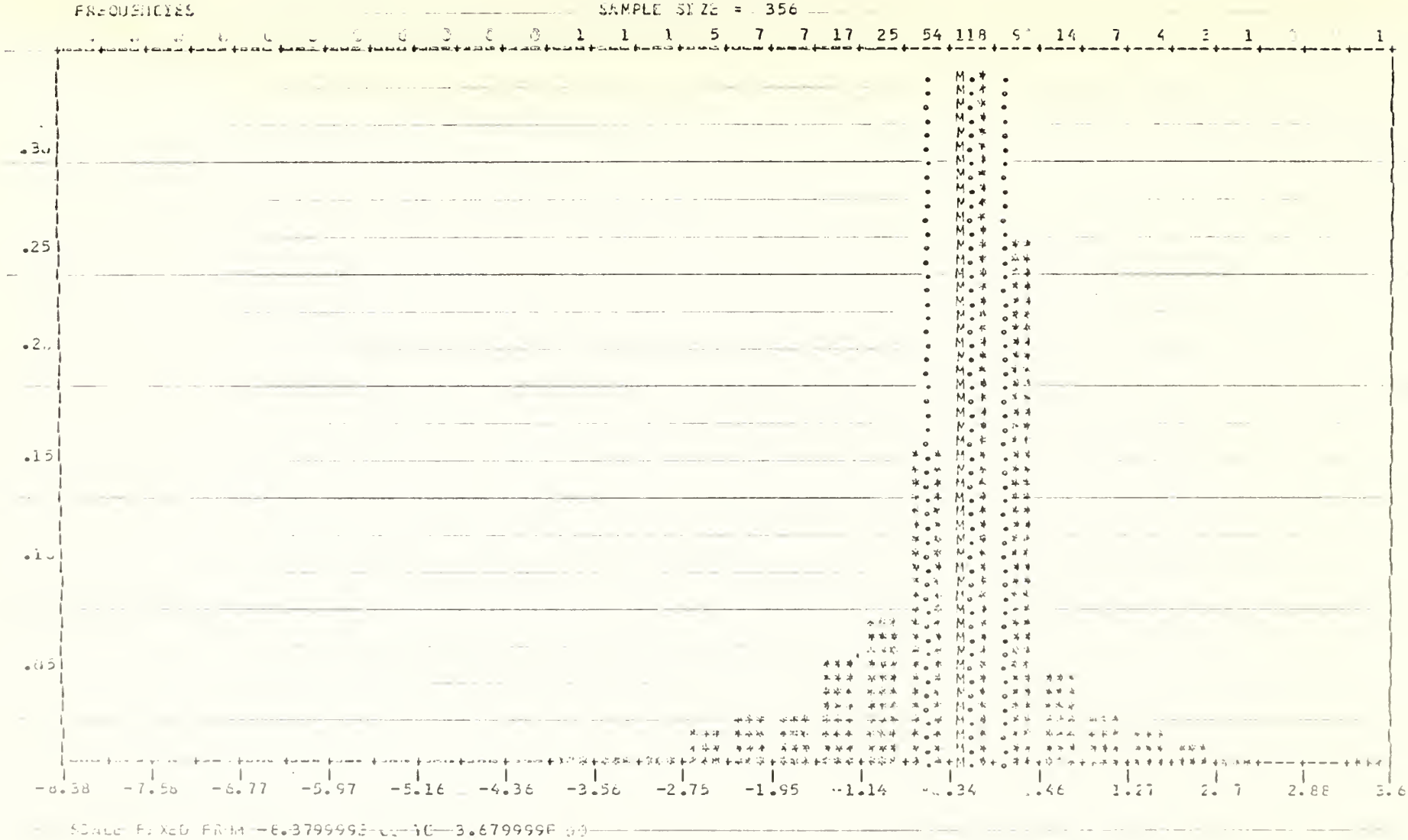
Δ_2 Errors of the FAST Model for All Pay Grades (High Volume Ratings Only)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-9.5571482E-01	VARIANCE	2.0448993 00	M3	-7.8074075 00	MINIMUM	-8.3845215 00
MEDIAN	-4.915[illegible]E-01	STD DEV	1.4299998 00	M4	4.5985522E 01	.10 QUANTILE	-2.4871655 00
TRIMEAN	-5.5928976E-01	COEF VAR	1.4962608 00	SKEWNESS	-2.6659321 00	.25 QUANTILE (HINGE)	-1.1637787 00
MIDMEAN	-5.3307776E-01	MEAN DEV	8.2182298E-01	KURTOSIS	7.9986778 00	.50 QUANTILE (MEDIAN)	-4.915[illegible]E-01

Δ_2 Errors of the Advancement Model for All Pay Grades (High Volume Ratings Only)

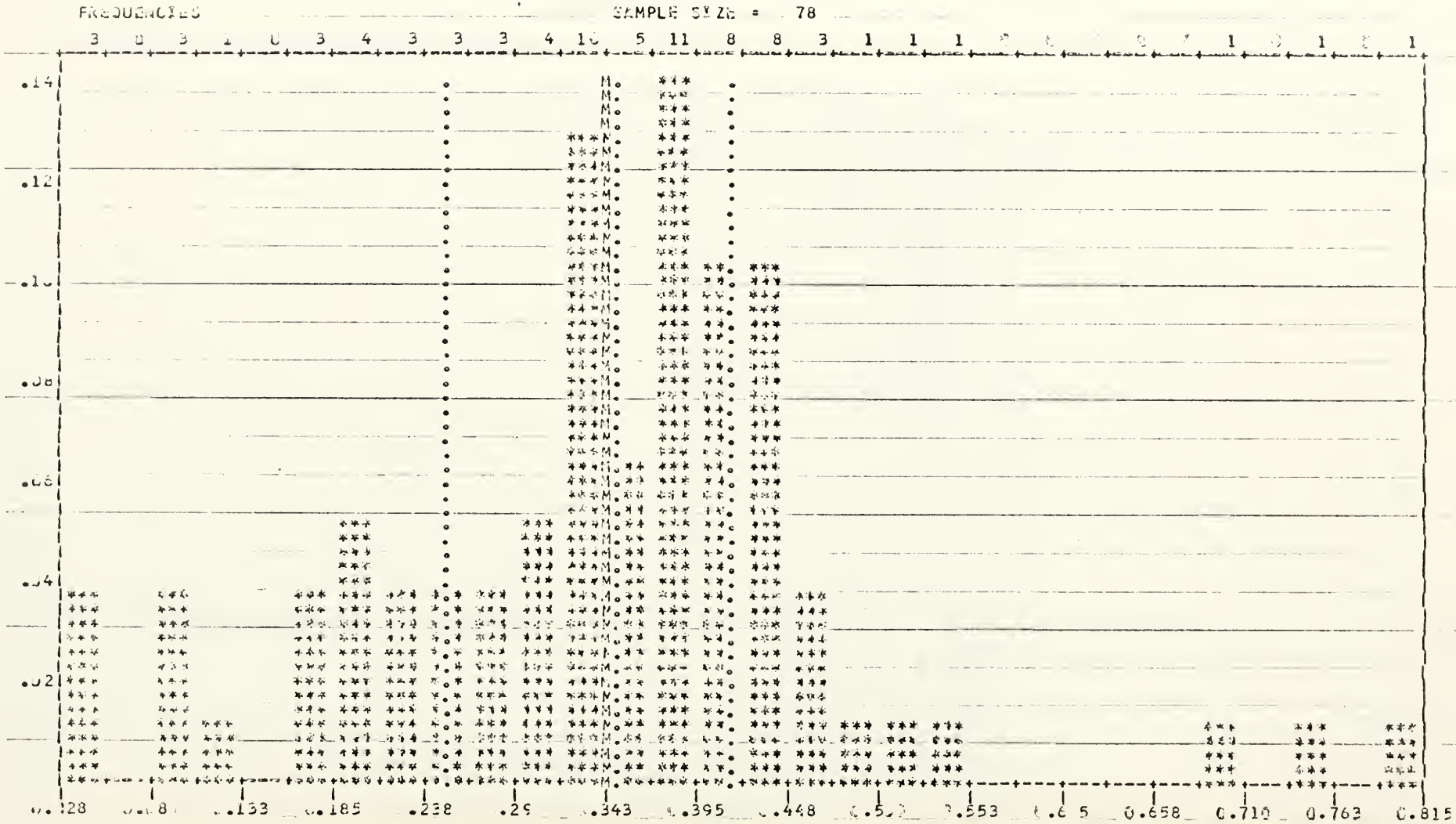
Δ_2 Errors of the Advancement Model for All Pay Grades (High Volume Ratings Only)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	-2.333954E-01	VARIANCE	6.276568E-01	M3	-2.775945E-01	MINIMUM	-3.617994E 00
MEDIAN	-1.150356E-01	STD DEV	7.922479E-01	M4	2.753625E 00	.1 QUANTILE	-1.166E 00
TRIMEAN	-1.427 24E-01	COEF VAR	3.394444E 00	SKEWNESS	-5.582485E-01	.25 QUANTILE (FENCE)	-5.076199E-01
MIDMEAN	-1.27 874E-01	MEAN DEV	5.256993E-01	KURTOSIS	3.931c79E 00	.5 QUANTILE (MIDPT)	-1.156358E-01
MIDRANGE	-3.949816E-02	RANGE	7.297885E 00	BETA1	-2.752596E-01	.75 QUANTILE (HINGE)	1.68 818E-01
		MIDSPREAD	6.757016E-01	BETA2	2.766295E 00	.90 QUANTILE	4.012289E-01
						MAXIMUM	3.679951E 00

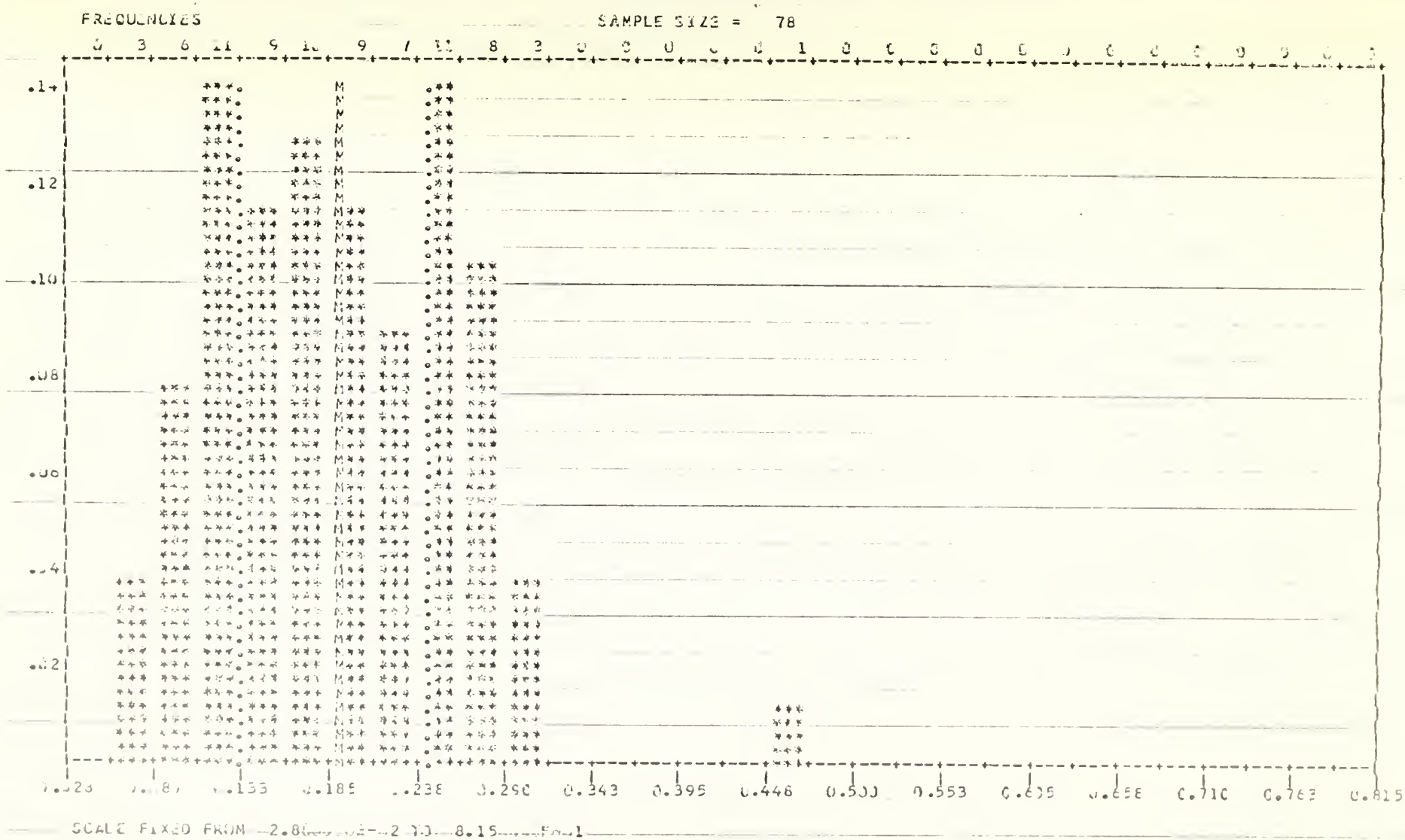
HISTOGRAMS OF Δ_3 ERRORS, HIGH VOLUME RATINGS ONLY, FAST MODEL AND ADVANCEMENT MODEL

Δ_3 Errors of the FAST Model for Pay Grade E4 (High Volume Ratings Only)



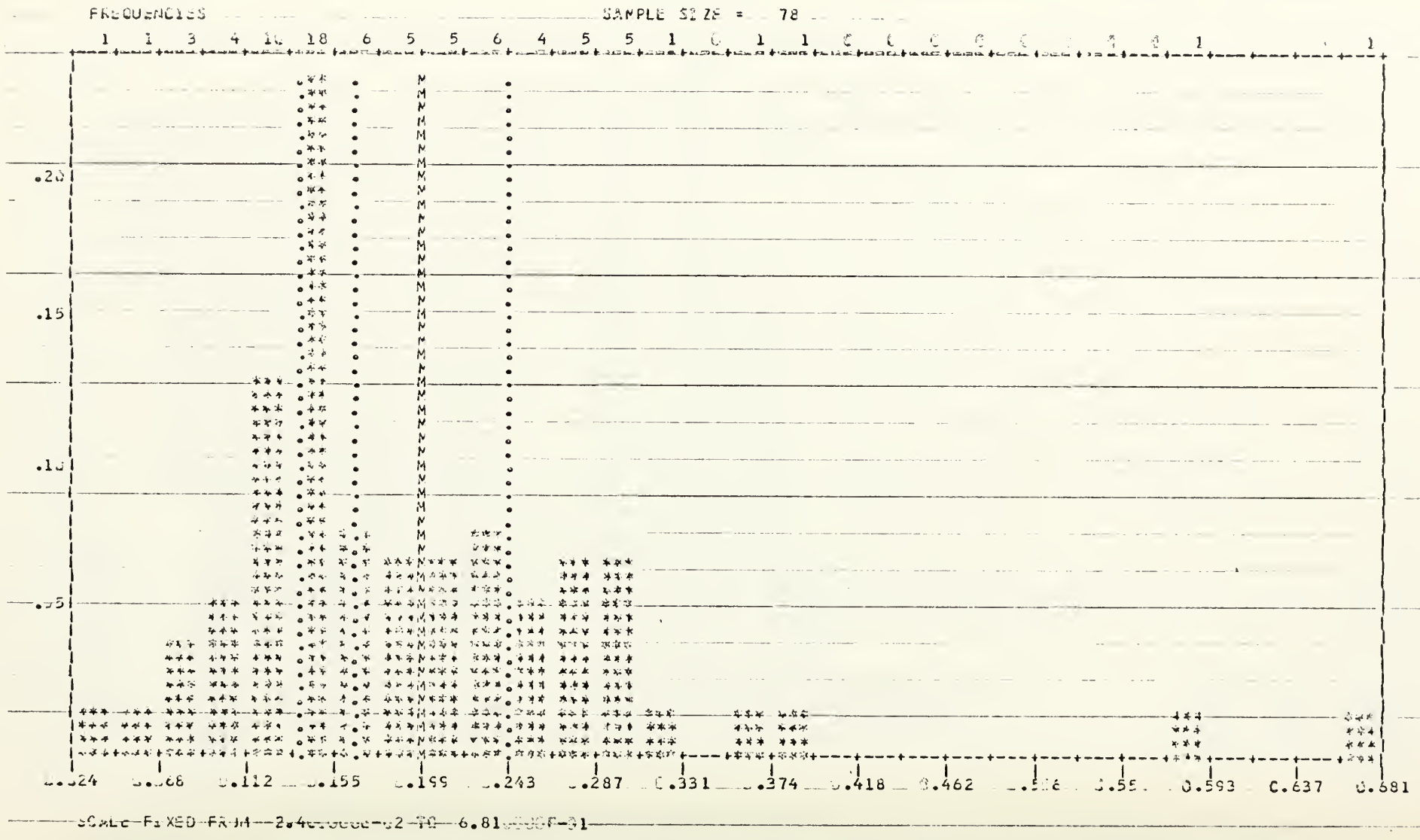
Δ_3 Errors of the Advancement Model for Pay Grade E4 (High Volume Ratings Only)

Δ_3 Errors of the Advancement Model for Pay Grade E4 (High Volume Ratings Only)

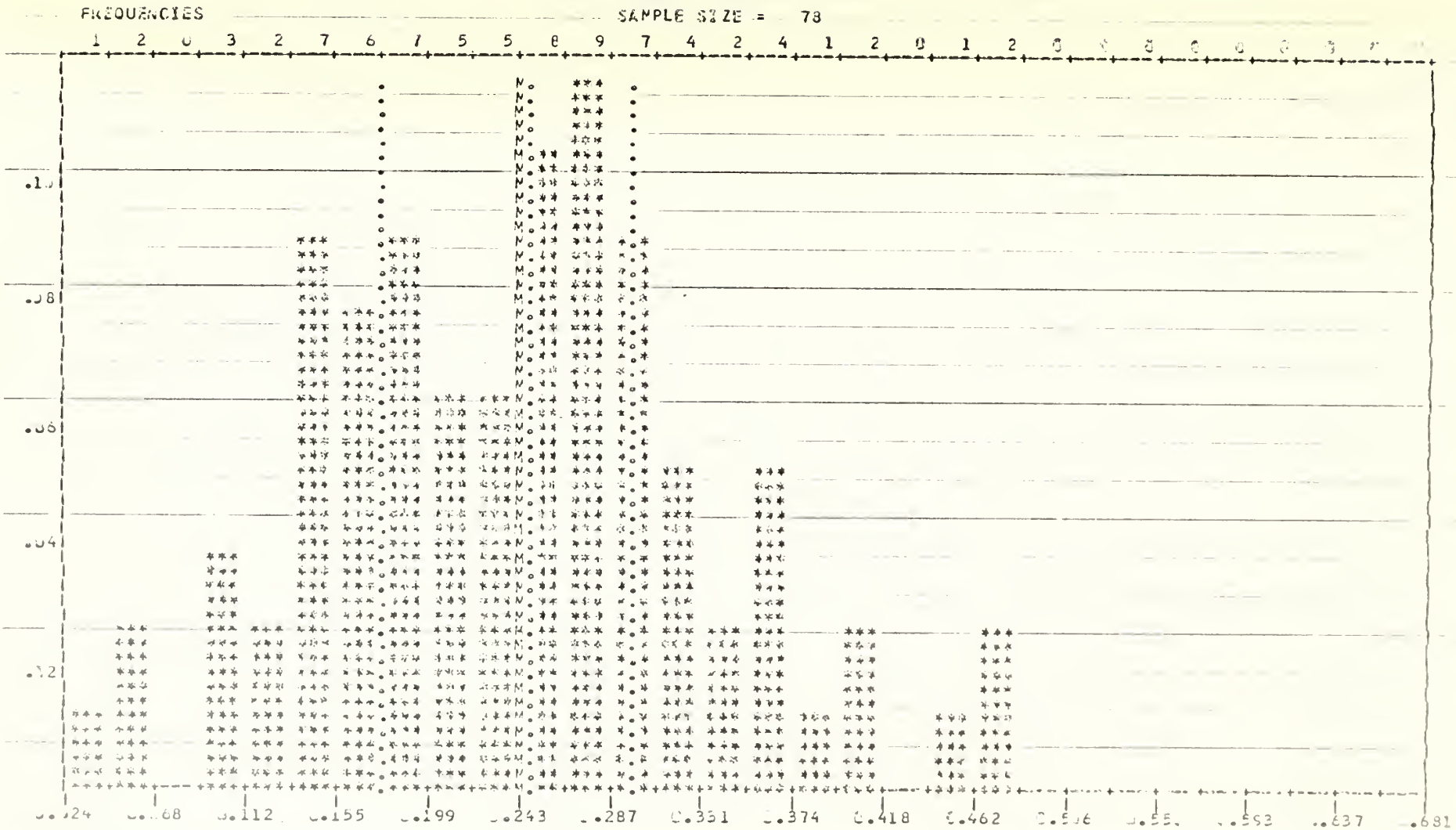


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.974557E-01	VARIANCE	5.266171E-03	M3	2.249485E-04	MINIMUM	5.5585 3 - 2
MEDIAN	1.854157E-01	S.D DEV	7.256835E-02	M4	1.519818E-04	.1 QUANTILE	9.833 66 - 02
TRIMEAN	1.856661E-01	COEF VAR	3.810249E-01	SKEWNESS	5.886288E-01	.25 QUANTILE (HINGE)	1.255 5 - 01
MIDMEAN	1.871359E-01	MEAN DEV	5.925151E-02	KURTOSIS	7.933 92E-01	.5 QUANTILE (MEDIAN)	1.854157E-01
MIDRANGE	2.575512E-01	RANGE	4. 473247E-01	BETA1	2.163707E-04	.75 QUANTILE (HINGE)	2.455629E-01
GEOM MEAN	1.764893E-01	M.D.S.P.R.E.A.D	1.184136E-02	BETA2	1.018983E-04	.9 QUANTILE	2.753759E-01
HARM MEAN	1.621271E-01					MAXIMUM	4.6 31748 - 1

Δ_3 Errors of the FAST Model for Pay Grade E5 (High Volume Ratings Only)

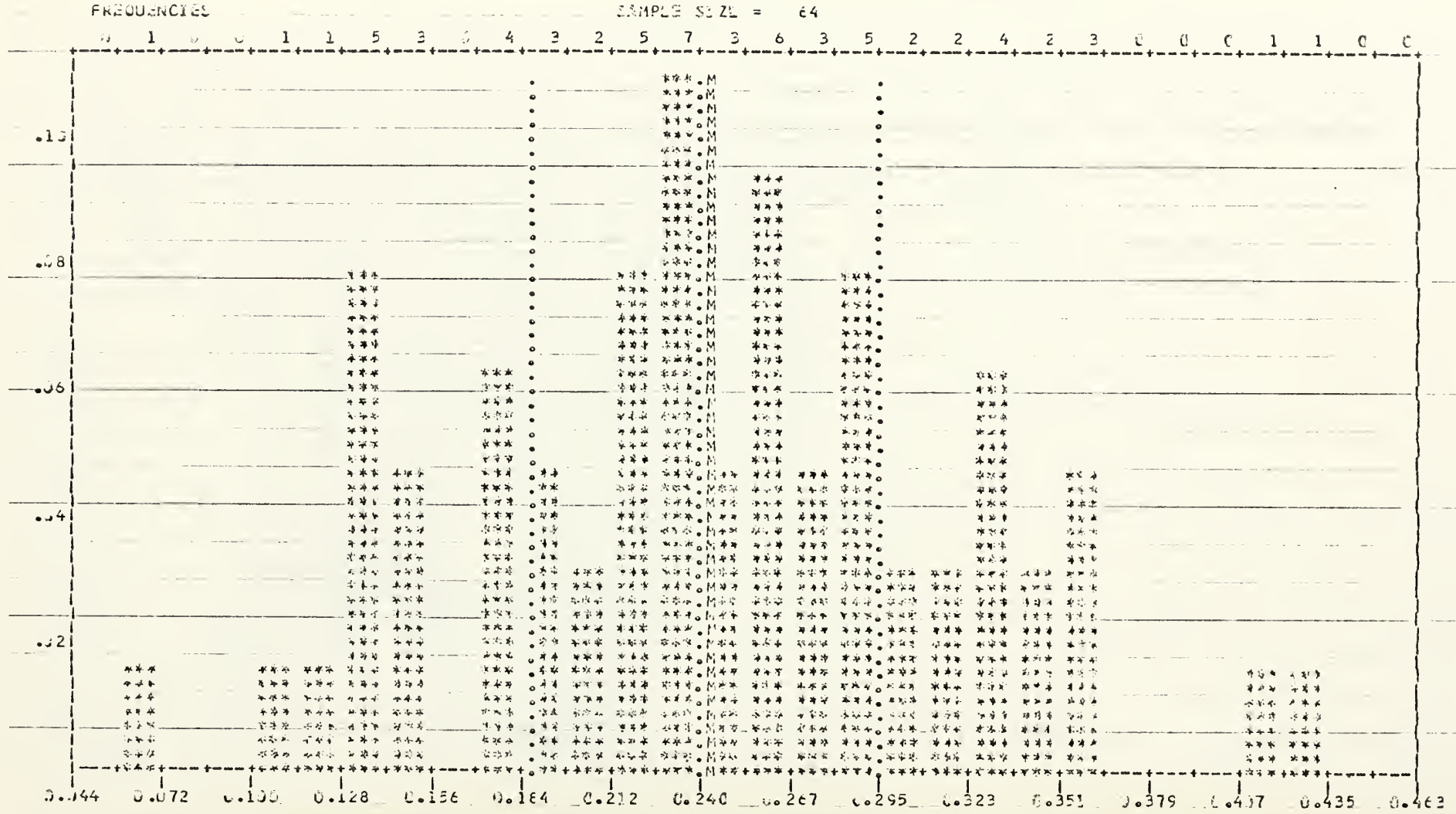


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.945219E-01	VARIANCE	1.038779E-02	M3	2.414344E-03	MINIMUM	4.279965E-02
MEDIAN	1.625121E-01	STD DEV	1.019258E-01	M4	1.156814E-03	.10 QUANTILE	1.046565E-1
TRIMEAN	1.748849E-1	COEF VAR	5.239537E 01	SKEWNESS	2.280416E 00	.25 QUANTILE (HINGE)	1.337914E-01



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.422294E-01	VARIANCE	8.765567E-03	M3	1.555194E-04	MINIMUM	2.431661E-02
MEDIAN	2.452343E-01	STD DEV	9.362459E-02	M4	2.272655E-04	.1 QUANTILE	1.266218E-01
HARMEAN	2.4[illegible]E-01	COEF VAR	3.865127E-01	SKEWNESS	1.948639E-01	.25 QUANTILE (FENGER)	1.755946E-01
MIDMEAN	2.396822E-01	MEAN DEV	7.420814E-02	KURTOSIS	-4.217529E-02	.50 QUANTILE (MEDIAN)	2.452343E-01
MIDRANGE	2.51[illegible]77E-01	RANGE	4.535422E-01	BETA1	1.538213E-04	.75 QUANTILE (HINGE)	3.[illegible]E-01
GEOM MEAN	2.2[illegible]E-01	MADSPREAD	1.182424E-01	BETA2	2.214681E-04	.90 QUANTILE	3.[illegible]E-01
HARM MEAN	1.868142E-01					MAXIMUM	4.778588E-01

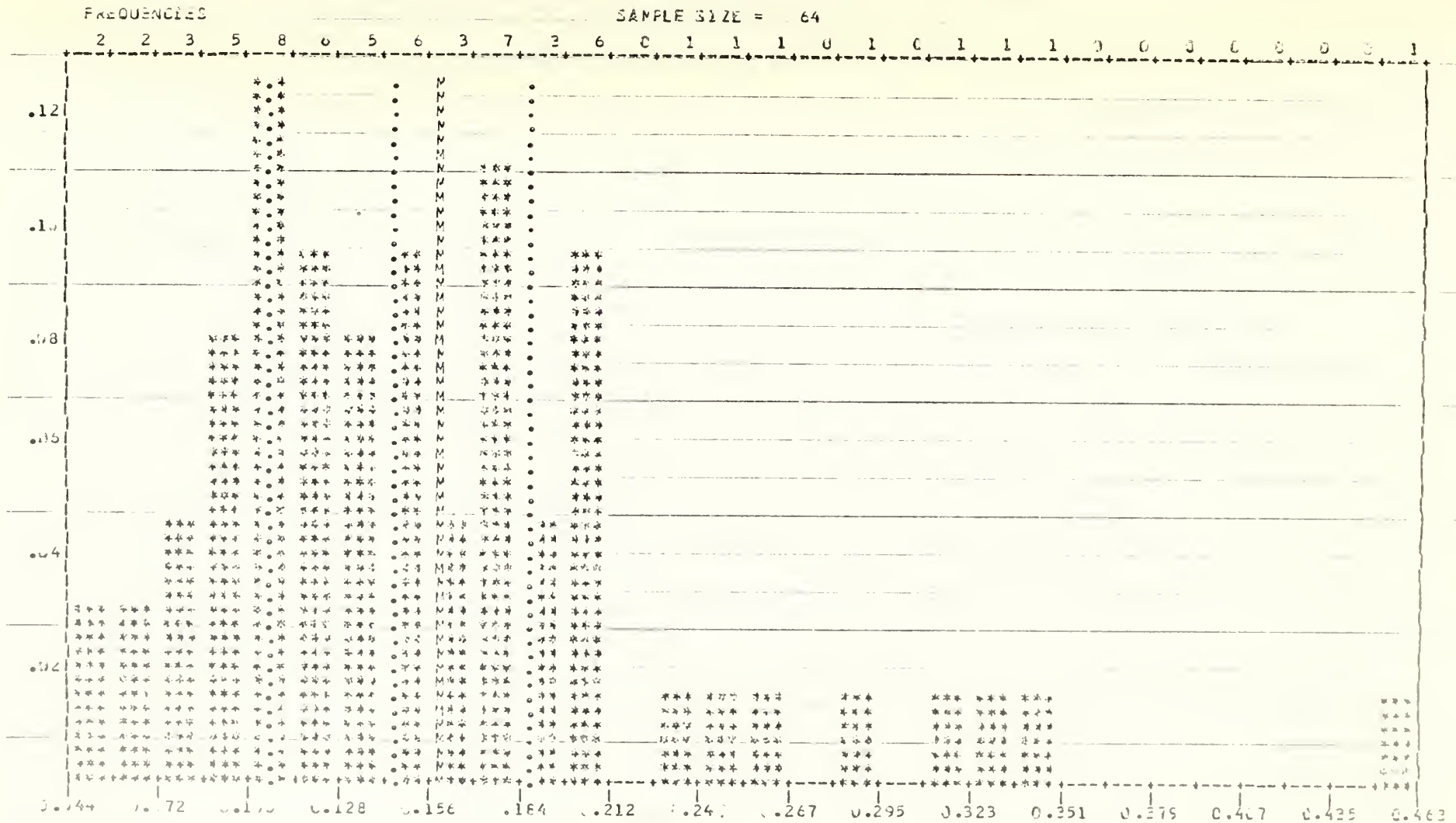
Δ_3 Errors of the FAST Model for Pay Grade E6 (High Volume Ratings Only)



SCALE FIXED FROM -4.400000E-02 TO 4.630000E-01

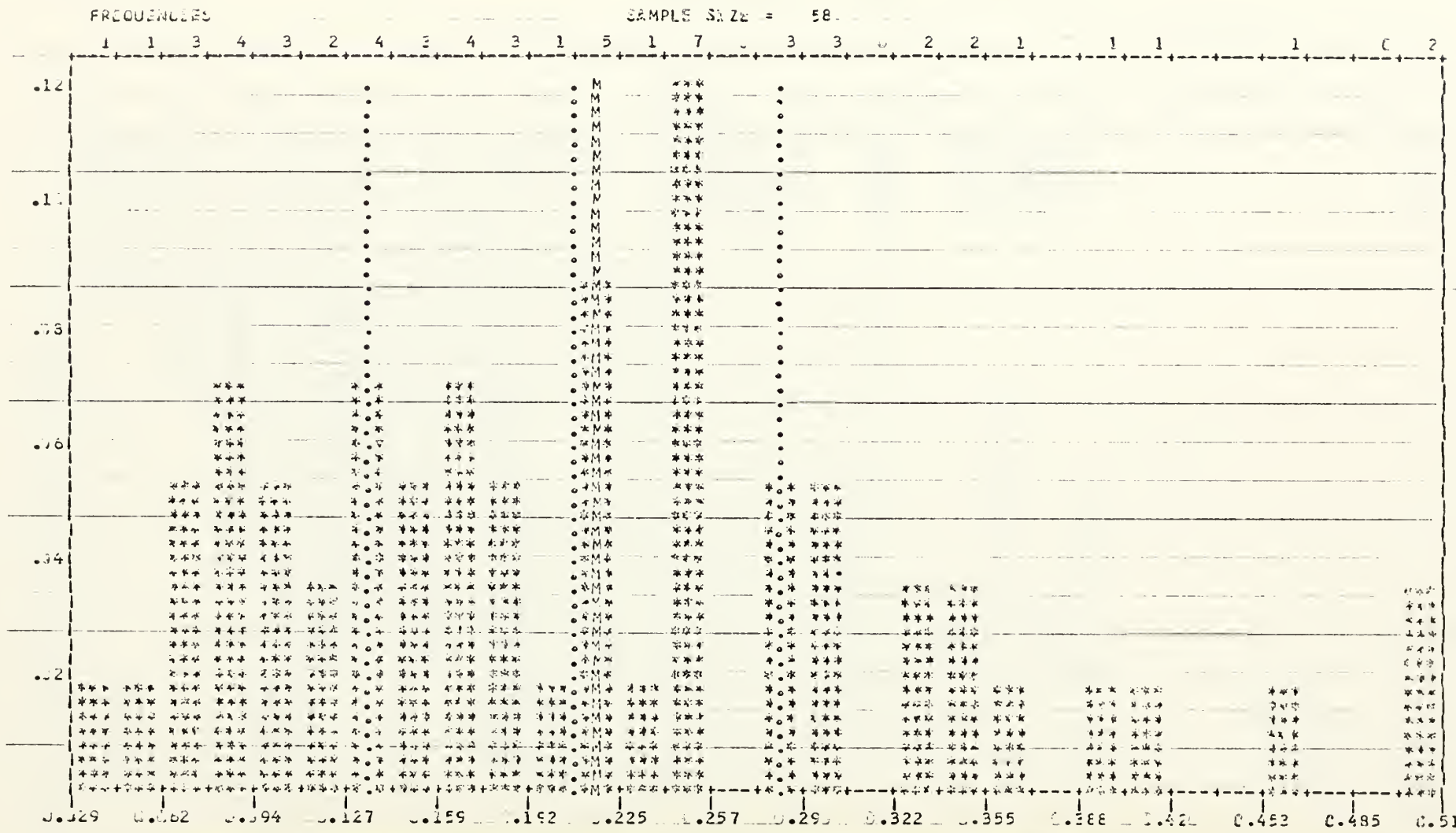
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.434279E-01	VARIANCE	6.0142395E-03	M3	2.854745E-05	MINIMUM	6.355296E-02
MEDIAN	2.395831E-01	STD DEV	7.7551545E-02	M4	9.673161E-05	.10 QUANTILE	1.203883E-01
TRIMEAN	2.426202E-01	COEF VAR	3.1858110E-01	SKEWNESS	6.126634E-02	.25 QUANTILE (HINGE)	1.872857E-01
MIDMEAN	2.436715E-01	M-ABS DEV	6.1353325E-02	KURTOSIS	-8.265486E-01	.5 QUANTILE (MEDIAN)	2.395831E-01

E_3 Errors of the Advancement Model for Pay Grade E6 (High Volume Ratings Only)



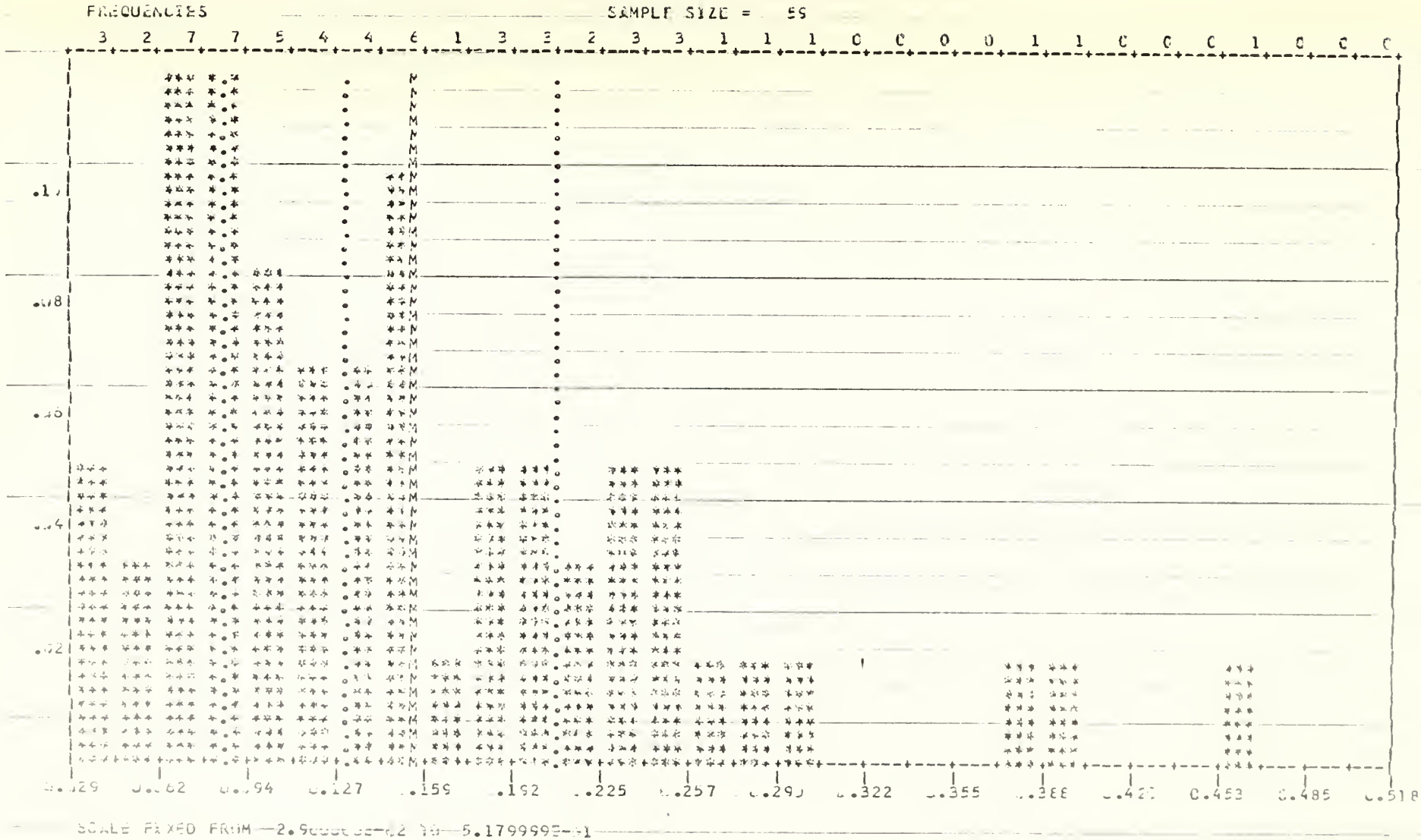
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.573138E-01	VARIANCE	5.6547195E-03	M3	6.7325573E-04	MINIMUM	4.39415 E-02
MEDIAN	1.42683 E-01	STD DEV	7.5197825E-02	M4	2.3819221E-04	.1 QUANTILE	7.3763 E-02
TRIMEAN	1.442 E-01	COEF VAR	4.7801117E-01	SKEWNESS	1.5833836E 00	.25 QUANTILE (FENCE)	1.05872 E-01
MIDMEAN	1.44 E-01	MEAN DEV	5.35913 E-02	KURTOSIS	3.51 921E 00	.5 QUANTILE (MEDIAN)	1.42683 E-01
MIDRANGE	2.2501 E-01	RANGE	4.19338E-01	BETA1	6.42 256E-04	.75 QUANTILE (FENCE)	1.85725E-01
GEOM MEAN	1.423 E-01	MIDSPREAD	7.9853E E-02	BETA2	1.9811115E-04	.9 QUANTILE	2.349 E-01
HARM MEAN	1.287153E-01					MAXIMUM	4.632E 4 E-1

Δ_3 Errors of the FAST Model for Pay Grade E7 (High Volume Ratings Only)



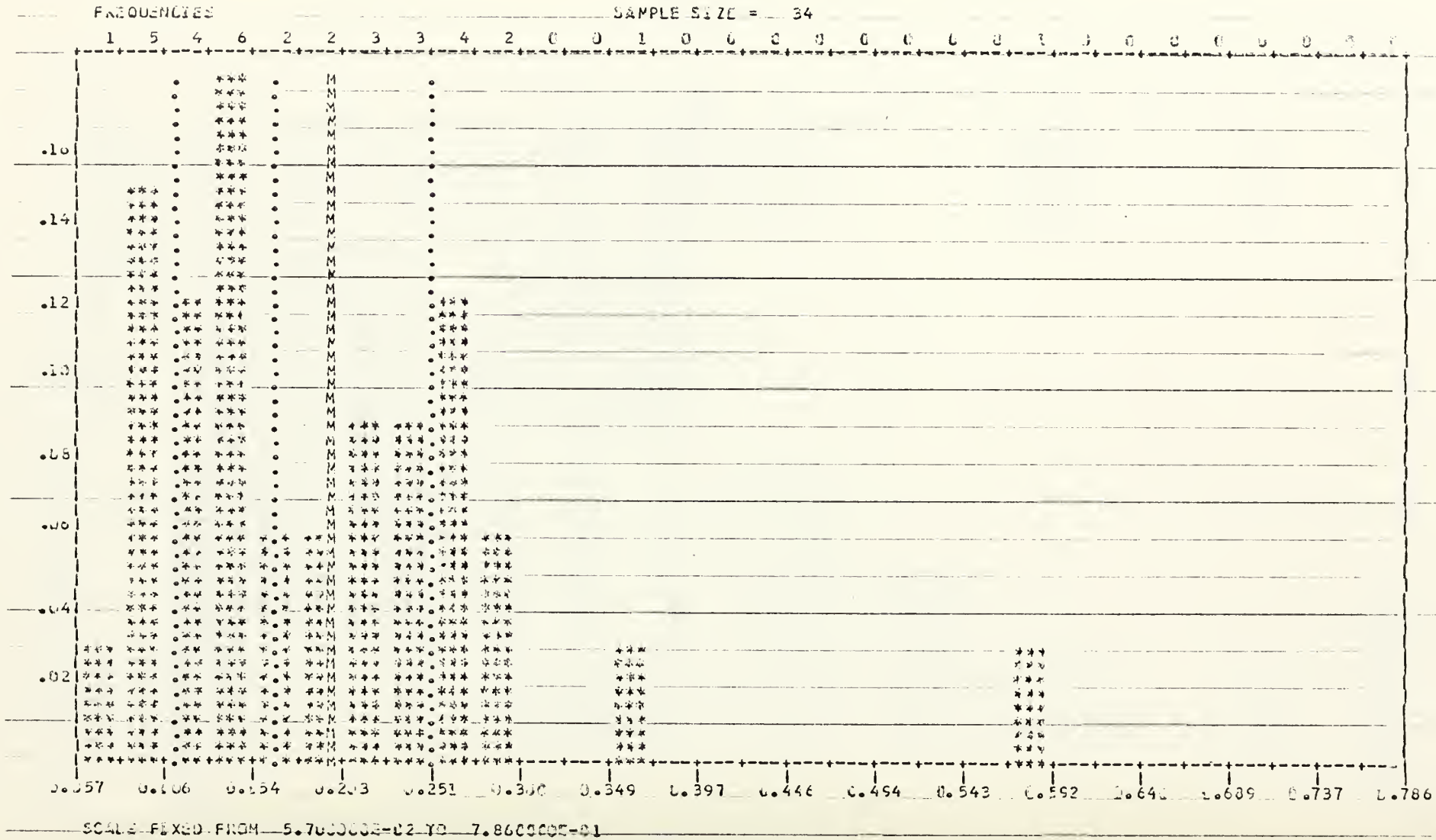
Δ_3 Errors of the FAST Model for Pay Grade E7 (High Volume Ratings Only)

Δ_3 Errors of the Advancement Model for Pay Grade E7 (High Volume Ratings Only)

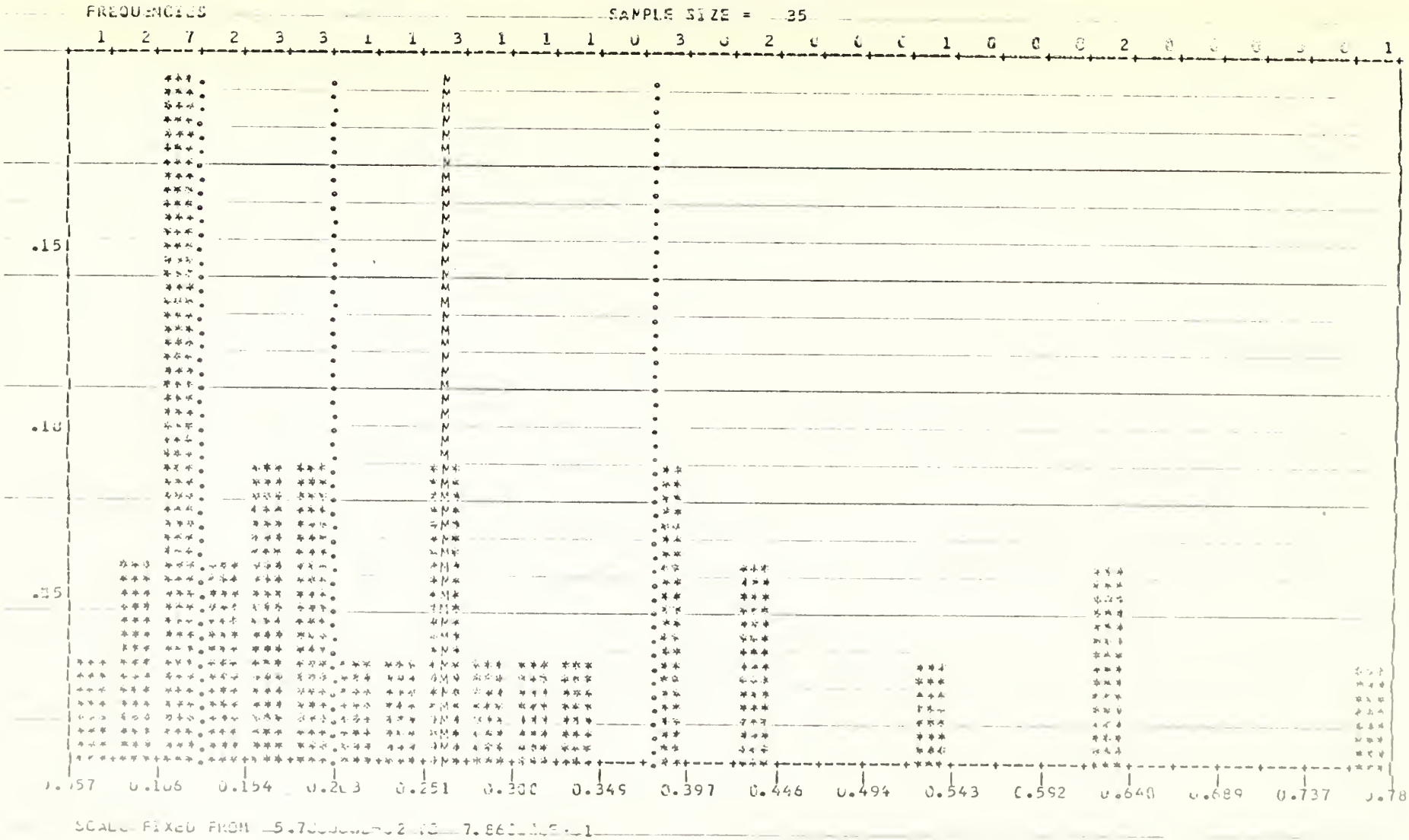


CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	1.513456E-01	VARIANCE	8.3404485E-03	M3	5.3660592E-04	MINIMUM	2.8471334E-02
MEDIAN	1.257972E-01	STD DEV	9.1326249E-02	M4	3.1572496E-04	.1 QUANTILE	4.6612355E-02
TRIMEAN	1.3795335E-01	COEF VAR	6.0342669E-01	SKEWNESS	1.2294875E 00	.25 QUANTILE (FENGER)	8.4962661E-02
MIDMEAN	1.3452594E-01	MEAN DEV	6.8559831E-02	KURTOSIS	1.5386455E 00	.5 QUANTILE (MEDIAN)	1.2979728E-01
MIDRANGE	2.4456661E-01	RANGE	4.3178938E-1	BETA1	8.8942525E-04	.75 QUANTILE (HINGE)	2.7657685E-01
GEO MEAN	1.2674351E-01	MAD SPREAD	1.2309498E-01	BETA2	3.0121986E-04	.9 QUANTILE	2.5119144E-01
HARM MEAN	1.0417962E-01					MAXIMUM	4.6046568E-01

Δ_3 Errors of the FAST Model for Pay Grade E8 (High Volume Ratings Only)

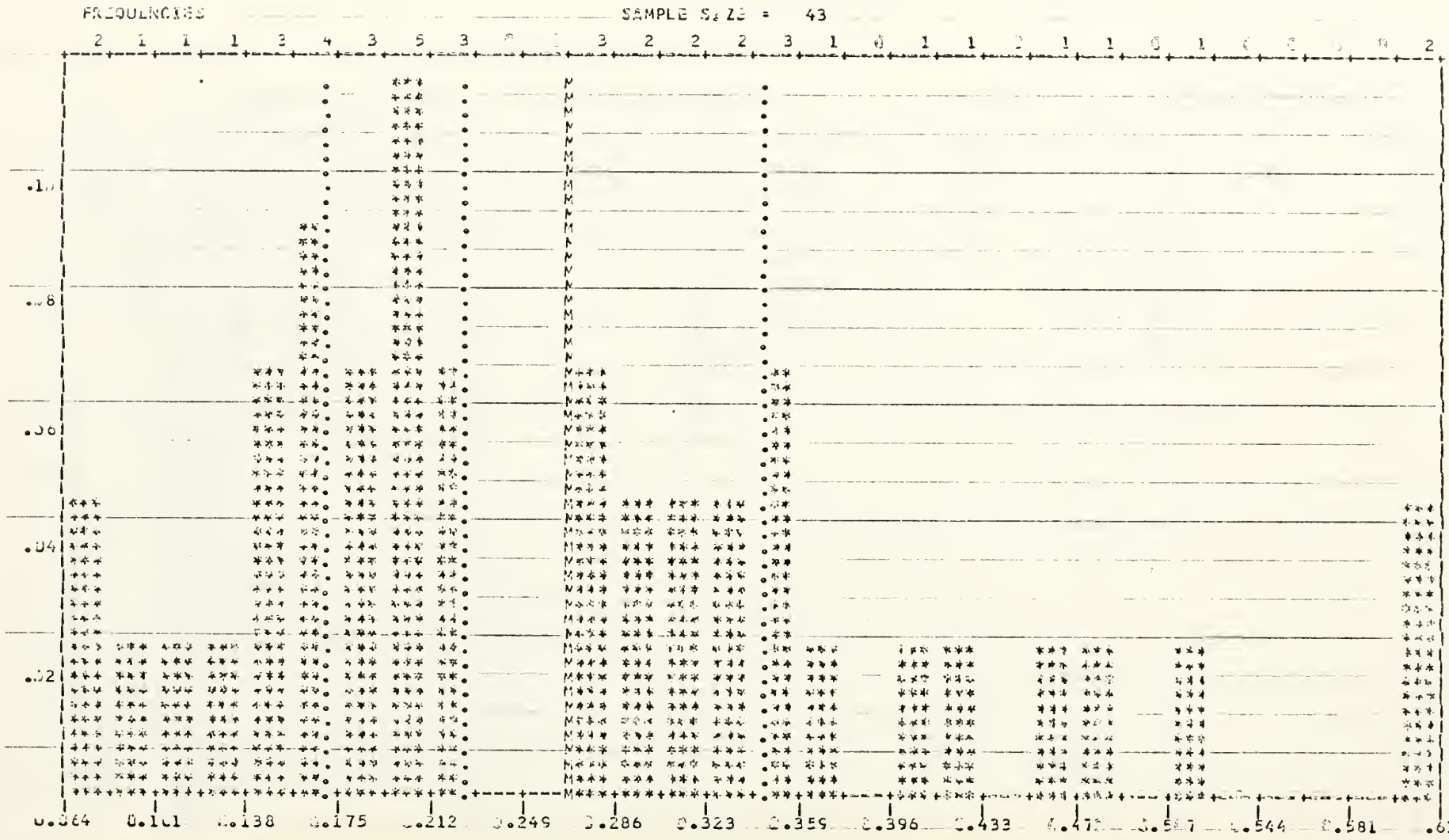


a_3 Errors of the Advancement Model for Pay Grade E8 (High Volume Ratings Only)



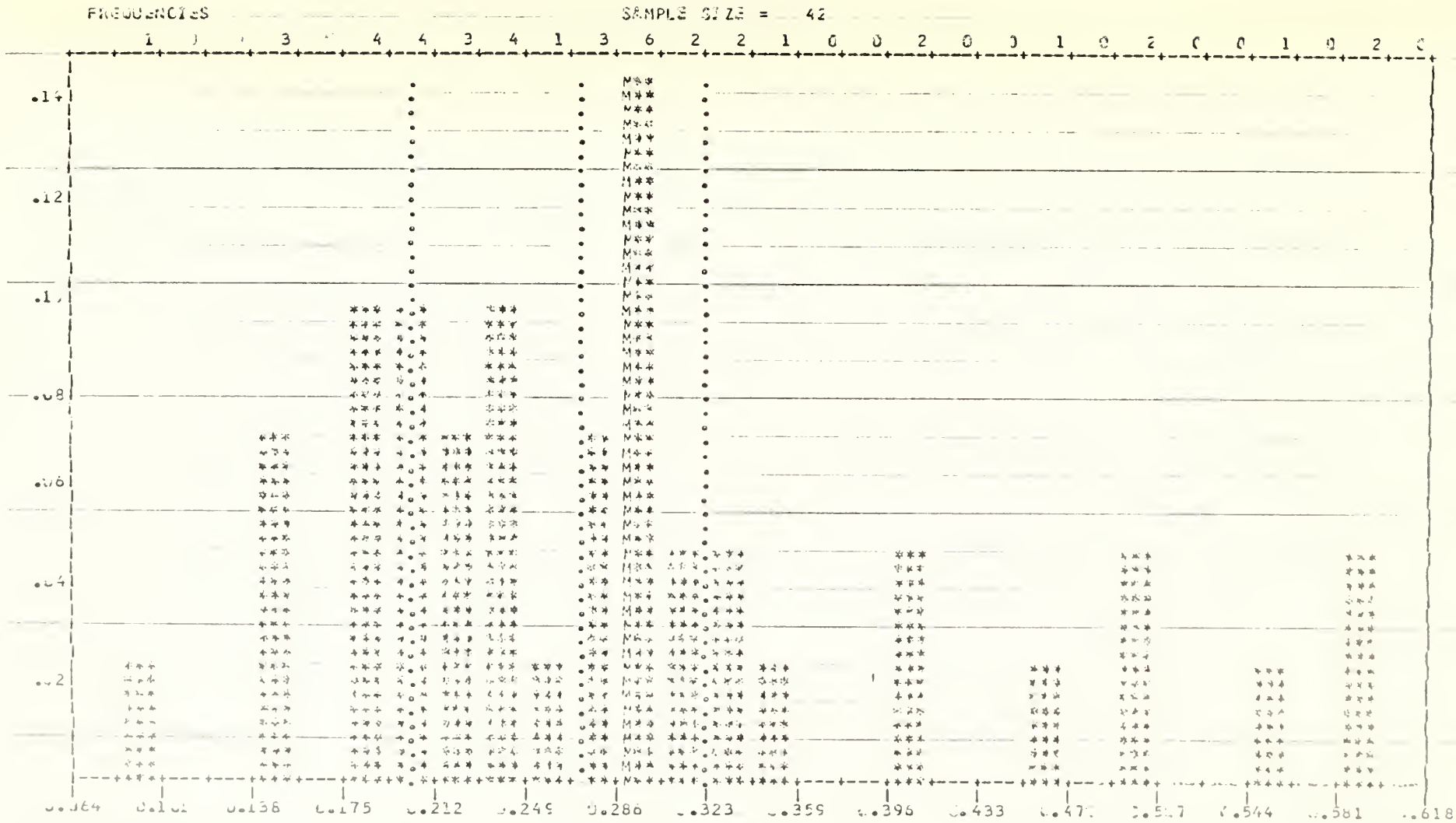
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION		
MEAN	2.022864E-01	VARIANCE	3.392415E-2	M3	7.09391 E-3	MINIMUM		6.368676E-2
MEDIAN	1.97[illegible]E-01	STD DEV	1.743341E-1	M4	3.83962E -3	.1 QUANTILE		5.9[illegible]E-2
MODE	2.243179E-01	COEF VAR	8.6467181E-01	SKEWNESS	1.32887[illegible] 00	.25 QUARTILE	(RANGE)	1.[illegible]E-1
MIDRANGE	2.169541E-01	MEAN D-V	1.2876275E-1	KURTOSIS	1.1567982 01	.5 QUANTILE	(MIDRAN)	1.97[illegible]E-1
RANGE	4.248[illegible]E-1	RANGE	7.218274E-01	BETA1	6.457443E-03	.75 QUANTILE	(RANGE)	2.[illegible]E-1
GEOM MEAN	2.162521E-01	MID SPREAD	2.539077E-01	BETA2	3.552682E-03	.9 QUANTILE		4.41[illegible]E-1
HARM MEAN	1.81[illegible]E-01					MAXIMUM		7.857142E-1

Δ_3 Errors of the FAST Model for Pay Grade E9 (High Volume Ratings Only)



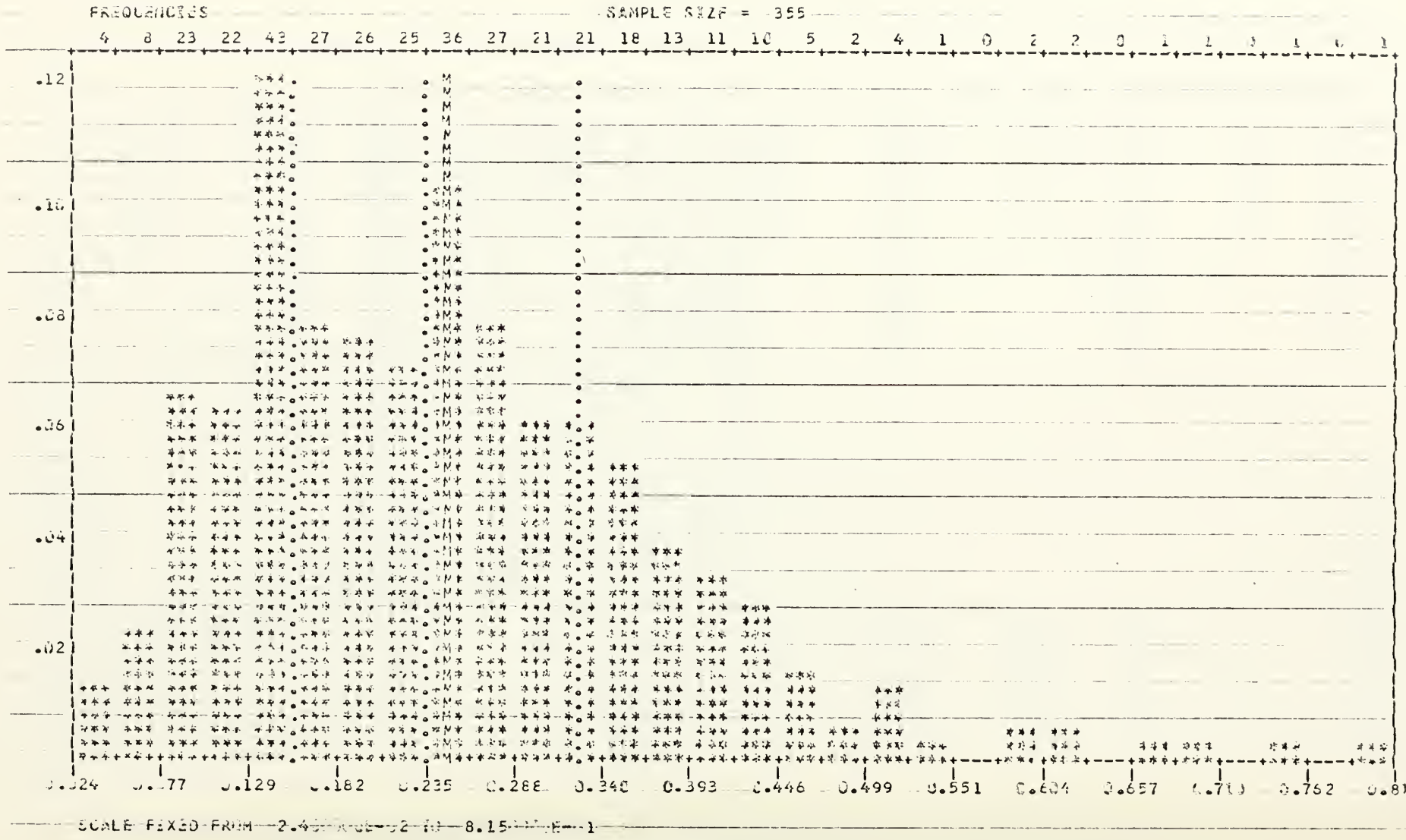
CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.645659E-01	VARIANCE	1.788682E-02	M3	2.186722E-03	MINIMUM	6.351270E-02
MEDIAN	2.218256E-01	STD DEV	1.337426E-01	M4	1.066644E-03	.10 QUANTILE	1.129275E-01
TRIMEAN	2.388422E-01	COEF VAR	5.055134E-01	SKEWNESS	9.141755E-01	.25 QUANTILE (HINGE)	1.674688E-01
MIDMEAN	2.432390E-01	MEAN DEV	1.042816E-01	KURTOSIS	3.432798E-01	.50 QUANTILE (MEDIAN)	2.218256E-01

E_3 Effects of the Advancement Model at Day [illegible] (Log Transformed)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.869834E-01	VARIANCE	1.465934E-02	M3	1.893595E-03	MINIMUM	9.554455E-02
MEDIAN	2.712769E-01	STD DEV	1.210757E-01	M4	7.411297E-04	.25 QUANTILE	1.594524E-01
MODE	2.669549E-01	COEF VAR	4.219 38E-01	SKEWNESS	1.066888 0 01	.25 QUANTILE (HYAGL)	2.033911E-01
MIDRANGE	2.083067E-01	MEAN DEV	8.864469E-02	KURTOSIS	4.487782E-01	.50 QUANTILE (MEDIAN)	2.712769E-01
MIDMEAN	2.449027E-01	RANGE	4.979934E-01	BETA1	1.766487E-03	.75 QUANTILE (HYNGI)	3.224917E-01
TRIMEAN	2.666625E-01	MIDSPREAD	1.206617E-01	BETA2	7.031769E-04	.9 QUANTILE	4.555555E-01
TRIM MEAN	2.767545E-01					MAXIMUM	5.536338E-01

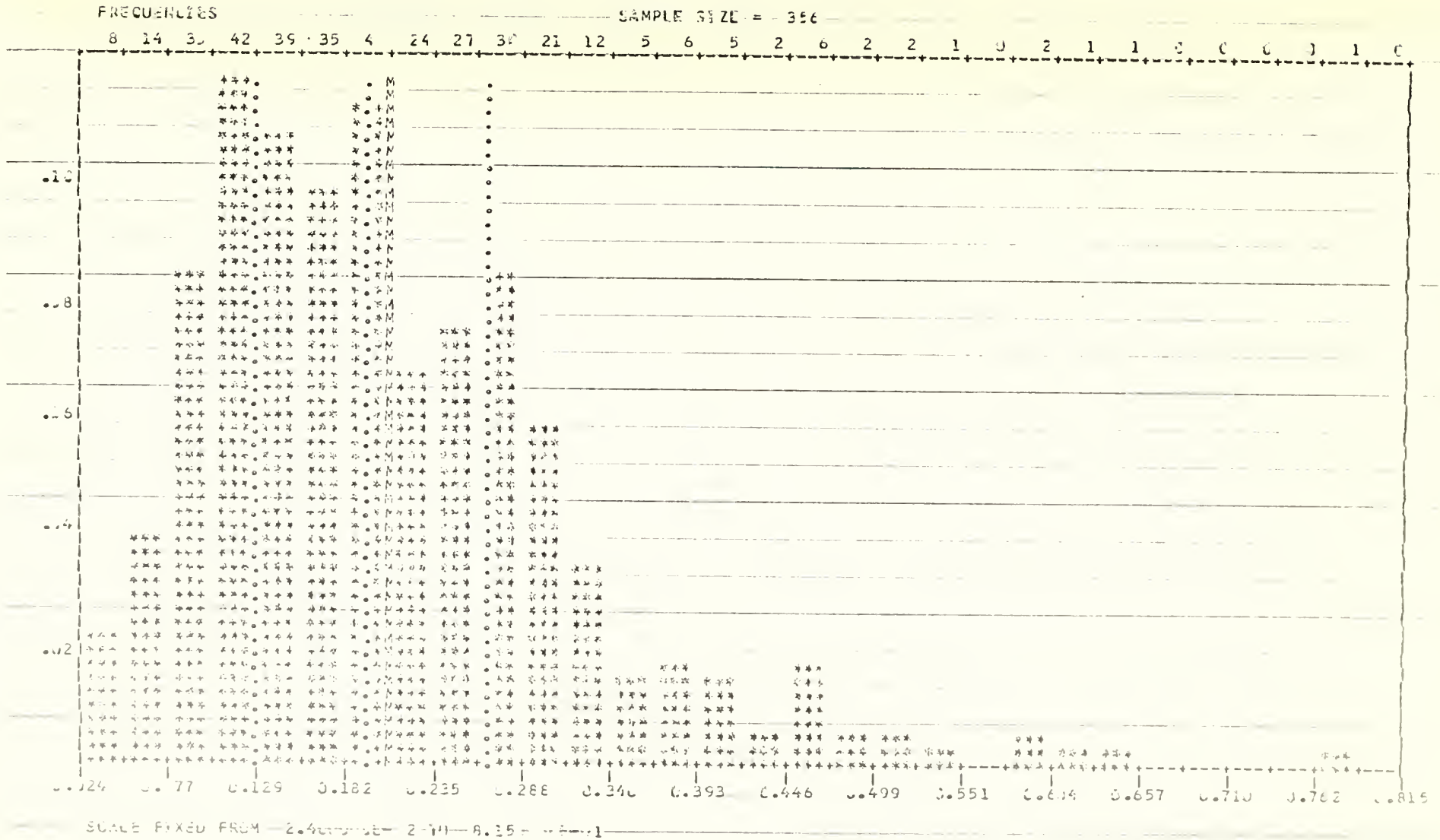
Δ_3 Errors of the FAST Model for All Pay Grades (High Volume Ratings Only)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION	
MEAN	2.401909E-01	VARIANCE	1.5786 25-02	M3	2.983948E-03	MINIMUM	2.8 3278E-02
MEDIAN	2.329470E-01	STD DEV	1.256424E-01	M4	1.2 5 62E-03	.10 QUANTILE	1.0 24591E-01
MIDMEAN	2.344307E-01	COEF VAR	5.[illegible]3318E-01	SKEWNESS	1.656698E 00	.25 QUANTILE (HINGE)	1.4822 3E-01
MID RAN	2.297715E-01	MEAN DEV	9.737378E-02	KURTOSIS	1.835752E 00	.50 QUANTILE (MEDIAN)	2.2 9947E-01

Δ_3 Errors of the Advancement Model for All Pay Grades (High Volume Ratings Only)

$_{3}$ Graphs of the Advancement Model for All Pay Grades (High Volume Ratings Only)



CENTRAL TENDENCY		SPREAD		HIGHER CENTRAL MOMENTS		DISTRIBUTION		
MEAN	2.48[illegible]E-01	VARIANCE	1.24[illegible]E-2	M3	1.871376E-03	MINIMUM		2.431661E-02
GEOM MEAN	[illegible]	STD DEV	1.113612E-1	M4	9.3-1563E-4	.1 QUANTILE		[illegible]
HARM MEAN	1.92[illegible]E-01	COEF VAR	5.352739E-01	SKEWNESS	1.255066E 00	.25 QUANTILE (FIRST)		1.288678E-01
MODE	1.92[illegible]E-1	MEAN DEV	8.288115E-2	KURTOSIS	3.481342E 00	.5 QUANTILE (MEDIAN)		1.885247E-01
MEDIAN	4.[illegible]E-1	RANGE	7.613976E-01	BETA1	1.855636E-03	.75 QUANTILE (THIRD)		2.661806E-01
SEMI MEAN	[illegible]	MIDSPREAD	1.495528E-01	BETA2	9.222862E-04	.90 QUANTILE		3.3[illegible]E-1
RANGE MEAN	1.53[illegible]E-1					MAXIMUM		7.857142E-1

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